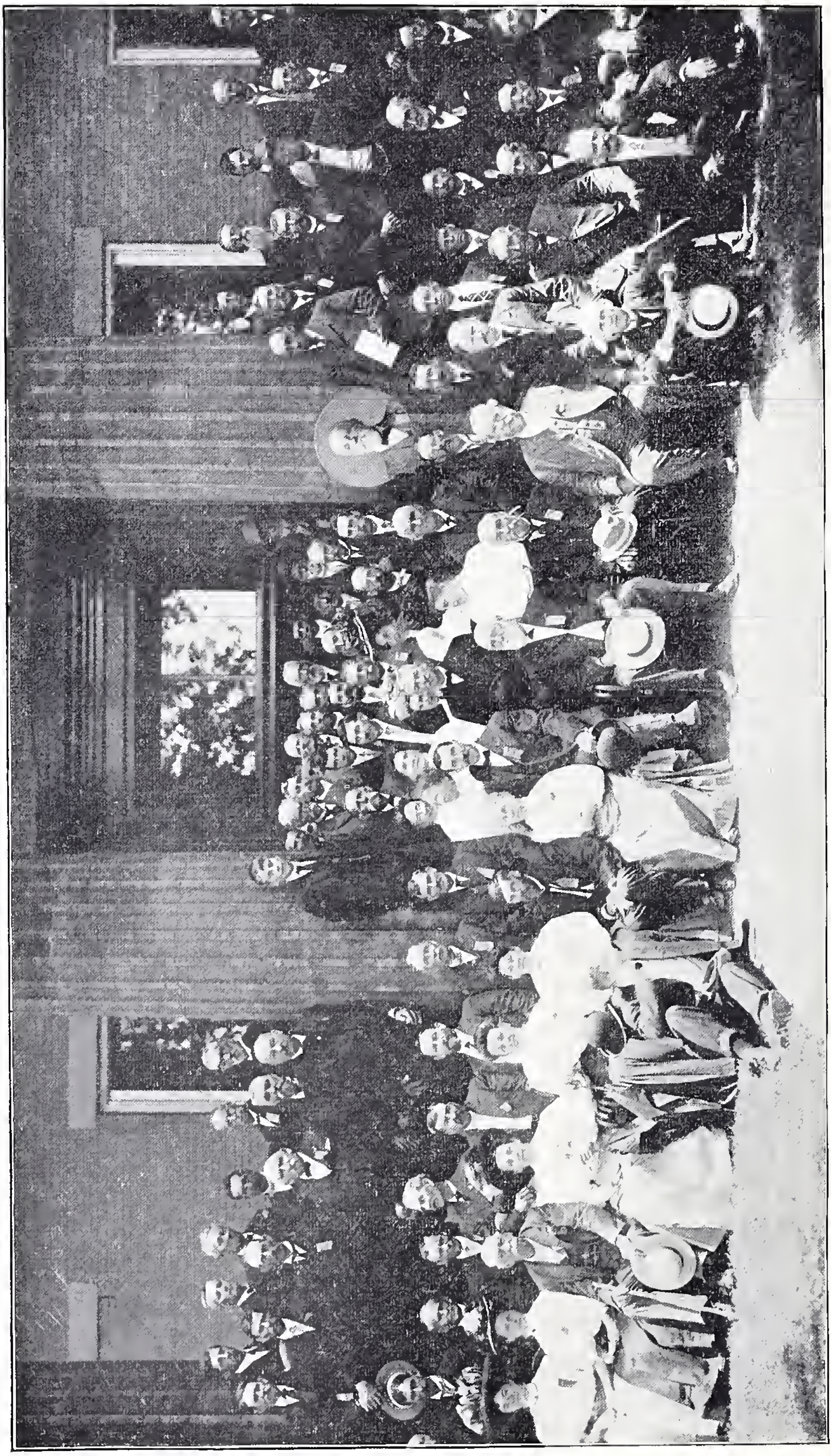

PENNSYLVANIA FARMERS' INSTITUTES LECTURERS AND COUNTY CHAIRMEN.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF AGRICULTURE.

BULLETIN No. 169.

PROCEEDINGS

OF THE

Farmers' Annual Normal Institute,

AND SPRING MEETING

STATE BOARD OF AGRICULTURE.

COMPILED BY A. L. MARTIN,
Deputy Secretary and Director of Institutes.

HELD IN THE

COURT HOUSE,

NEW CASTLE, PA.

MAY 26 TO 29, 1908.

HARRISBURG, PA.:
HARRISBURG PUBLISHING CO., STATE PRINTER.
1908.

VIRTUE
LIBERTY AND
INDEPENDENCE

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PREFACE.

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., July 15, 1908.

There is perhaps no source of information upon subjects relating to either practical or scientific agriculture that is so easily available as the Farmers' Institute, and whatever adds to the efficiency of these institutes is of paramount importance. The hope of increasing their usefulness to the farmers of the State has led to the establishment of what is known as the Farmers' Normal Institute, in which all institute managers and lecturers of the State come together once a year for consultation and instruction.

In order that the instruction given at these institutes may be available to the greatest possible number, this Department publishes in bulletin form their proceedings, and so we send out the following bulletin, No. 169, containing the full proceedings of the Normal Institute held at New Castle, Pa., May 26-9, 1908, in the hope that it may prove helpful upon the many farms and in the many farmhouses to which it may come.

N. B. CRITCHFIELD,
Secretary of Agriculture.

LETTER OF TRANSMITTAL.

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., July 12, 1908.

Hon. N. B. Critchfield, Secretary of Agriculture:

Dear Sir: I have the honor to present herewith, bulletin of the Eighth Annual "Farmers' Normal Institute," which was held at New Castle, Pa., May 26 to 29, 1908.

Very respectfully,
A. L. MARTIN,
Director of Institutes.

MEMBERS

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1908.

Members Ex-Officio.

HON. EDWIN S. STUART, Governor.
HON. HENRY HOUCK, Secretary of Internal Affairs.
DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
DR. EDWIN EARLE SPARKS, President of the State College.
HON. ROBERT K. YOUNG, Auditor General.
HON. N. B. CRITCHFIELD, Secretary of Agriculture.

Appointed by the Governor.

Gen. James A. Beaver, Center County,	Term expires 1910
R. I. Young, Middletown, Dauphin County,	Term expires 1911
R. H. Thomas, Jr., Mechanicsburg, Cumberland County,	Term expires 1912

Appointed by the State Poultry Association.

J. D. Nevius,	Philadelphia,	1910

Elected by County Agricultural Societies.

			Term expires.
Adams,	A. I. Weidner,	Arendtsville,	1909
Allegheny,	J. S. Burns,	Imperial, R. F. D. No. 1.	1909
Armstrong,	S. S. Blyholder,	Neale,	1911
Beaver,	A. L. McKibben,	New Sheffield,	1911
Bedford,	W. C. Lutz,	Bedford,	1909
Berks,	Howard Cox,	Geiger's Mills,	1910
Blair,		Bellwood,	1911
Bradford,	H. G. McGowan,	Wysox,	1910
Bucks,	Edwin Platt,		
Butler,	N. F. Bartley,	Euclid,	1911
Cambria,	H. M. Gooderham,	Patton, R. F. D.,	1910
Cameron,			
Carbon,			
Centre,	John A. Woodward,	Howard,	1909
Chester,	M. E. Conard,	Westgrove,	1909
Clarion,	S. X. McClellan,	Knox,	1910
Clearfield,	E. M. Davis,	Grampian,	1910
Clinton,	J. A. Herr,	Millhall, R. F. D.,	1911
Columbia,	A. P. Young,	Millville,	1909

			Term expires.
Crawford,	J. F. Seavy,	Saegerstown,	1911
Cumberland,	Chas. H. Mullin,	Mt. Holly Springs,	1909
Dauphin,			
Delaware,	R. M. Heyburn,	Ward,	1911
Elk,	John M. Witman,	St. Mary's,	1911
Erie,			
Fayette,			
Forest,			
Franklin,	John P. Young,	Marion,	1911
Fulton,	J. L. Patterson,	McConnellsburg,	1910
Greene,	N. M. Biddle,	Carmichaels,	1910
Huntingdon,	Geo. G. Hutchison,	Warrior's Mark,	1909
Indiana,	S. M. McHenry,	Indiana,	1910
Jefferson,	Peter Cowan,	Brookville,	1910
Juniata,	Matthew Rodgers,	Mexico,	1909
Lackawanna,	Horace Seamans,	Factoryville,	1910
Lancaster,			
Lawrence,	Sam'l McCreary,	Volant,	1909
Lebanon,	H. C. Snavely,	Cleona,	1910
Lehigh,	P. S. Fenstermaker,	Allentown,	1909
Luzerne,			
Lycoming,	A. J. Kahler,	Hughesville,	1909
McKean,			
Mercer,	W. C. Black,	Mercer,	1911
Mifflin,	M. M. Naginey,	Milroy,	1910
Monroe,	R. F. Schwarz,	Analomink,	1911
Montgomery,	J. Sexton,	North Wales,	1911
Montour,			
Northampton,	W. F. Beck,	Easton, R. F. D.,	1909
Northumberland,	I. A. Eschbach,	Milton, R. F. D.,	1911
Perry,	A. T. Holman,	Millerstown,	1910
Philadelphia,	Edwin Lonsdale,	Girard College, Phila.,	1910
Pike,			
Potter,	H. H. Hall,	Ellisburg,	1909
Schuylkill	W. H. Stout,	Pinegrove,	1910
Snyder,	J. F. Boyer,	Freeburg,	1909
Somerset,	John C. Weller,	Rockwood,	1911
Sullivan,	E. R. Warburton,	Dushore, R. F. D. No. 3,	1909
Susquehanna,	Frank A. Davies,	Montrose,	1910
Tioga,	E. B. Dorsett,	Mansfield,	1911
Union,	J. Newton Glover,	Vicksburg,	1911
Venango,			
Warren,	R. J. Weld,	Sugargrove,	1911
Washington,	D. S. Taylor,	Burgettstown,	1911
Wayne,	Warren E. Perham,	Niagara,	1910
Westmoreland,	M. P. Shoemaker,	Greensburg,	1910
Wyoming,	D. A. Knuppenburg,	Lake Carey,	1910
York,	G. F. Barnes,	Rossville,	1911

OFFICERS.

PRESIDENT.

Hon. Edwin S. Stuart, Governor,	Harrisburg.

VICE PRESIDENTS.

R. F. Schwarz,	Analomink.
G. G. Hutchison,	Warrior's Mark.
S. S. Blyholder,	Neale.

EXECUTIVE COMMITTEE.

J. Newton Glover, Chairman,	Vicksburg.
H. C. Snavely,	Cleona.
A. J. Kahler,	Hughesville.
A. T. Holman,	Millerstown.
W. H. Stout,	Pinegrove.
Matthew Rodgers,	Mexico.
M. M. Naginey,	Milroy.
H. G. McGowan,	Geiger's Mills.
N. B. Critchfield, Secretary,	Harrisburg.

ADVISORY COMMITTEE.

N. B. Critchfield, Secretary,	Harrisburg.
Matthew Rodgers,	Mexico.
H. C. Snavely,	Cleona.
M. M. Naginey,	Milroy.

CONSULTING SPECIALISTS.

Botanist,	Prof. W. A. Buckhout,	State College.
Pomologist	Dr. J. H. Funk,	Boyertown.
Chemist,	Dr. William Frear,	State College.
Vet. Surgeon,	Dr. Leonard Pearson,	Philadelphia.
Sanitarian,	Dr. Geo. G. Groff,	Lewisburg.
Misroscopists and Hygienists,	Prof. C. B. Cochran,	West Chester.
	Dr. Harvey B. Bashore,	West Fairview.
Entomologists,	Prof. H. A. Surface,	Harrisburg.
	Prof. Franklin Menges,	York.
Ornithologist,	Prof. H. A. Surface,	Harrisburg.
Meteorologists,	Prof. W. G. Owens,	Lewisburg.
	Silas R. Eshleman,	Harrisburg.
Mineralogist,	Baird Habberstadt,	Pottsville.
Apiarist,	H. C. Klinger,	Liverpool.
Geologists,	Dr. Isaac A. Harvey,	Lock Haven.
	W. H. Stout,	Pinegrove.
Forests and Forestry,	Robert Conklin,	Harrisburg.

STANDING COMMITTEES.

LEGISLATION.

Hon. A. J. Kahler, Chairman,	Hughesville.
Hon. Jason Sexton,	North Wales.
Hon. H. G. McGowan,	Geiger's Mills.
Matthew Rodgers,	Mexico.
S. S. Blyholder,	Neale.

CEREALS AND CEREAL CROPS.

J. Newton Glover, Chairman,	Vicksburg.

ROADS AND ROAD LAWS.

Samuel McCreary, Chairman,	Volant.

FRUIT AND FRUIT CULTURE.

H. H. Hall, Chairman,	Ellisburg.

DAIRY AND DAIRY PRODUCTS.

W. E. Perham, Chairman,	Niagara.

FERTILIZERS.

Jason Sexton, Chairman,	North Wales.

WOOL AND TEXTILE FIBRES.

W. C. Black, Chairman,	Mercer.

LIVE STOCK.

I. A. Eschbach, Chairman,	Milton.

POULTRY.

J. D. Nevius, Chairman,	Philadelphia.

FLORICULTURE.

Edwin Lonsdale, Chairman,	Girard College, Phila.

FEEDING STUFFS.

G. G. Hutchison, Chairman,	Warrior's Mark.

PROCEEDINGS OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE, AT A MEETING HELD IN THE COURT HOUSE, NEW CASTLE, PA., TUESDAY, MAY 26, 1908.

ORDER OF BUSINESS.

Call to order at 1.30 P. M.
Roll-call of members.
Reading of minutes.
Appointment of Committee on Credentials.
Reception of Credentials of New Members and Delegates.
Unfinished business.
New business.
Miscellaneous business.
Adjournment.

Court House, New Castle, Pa.,
Tuesday, May 26, 1908, 1.30 P. M.

Vice-President Schwarz in the Chair.

The CHAIRMAN: Gentlemen, we will now come to order. The first thing on the program, I believe, is roll-call. Will the Secretary please call the roll?

Secretary Critchfield called the roll, the following members responding to their names: A. I. Weidner, J. S. Burns, A. L. McKibben, W. C. Lutz, H. G. McGowan, H. M. Gooderham, John A. Woodward, M. E. Conard, S. X. McClellan, J. A. Herr, A. P. Young, J. F. Seavy, Geo. G. Hutchison, S. M. McHenry, Peter B. Cowan, Matthew Rodgers, Horace Seamans, Samuel McCreary, A. J. Kahler, M. M. Naginey, R. F. Schwarz, W. H. Stout, J. Newton Glover, R. J. Weld, D. S. Taylor, Warren E. Perham, G. F. Barnes, R. H. Thomas, Jr., and N. B. Critchfield, Secretary.

The CHAIRMAN: It appears that we have a quorum present; we will therefore proceed with our business. The next in order, I believe, is the appointment of a committee on credentials. I will name the following gentlemen to serve on this committee: Messrs. J. A. Herr, A. J. Kahler and M. M. Naginey.

Are there any credentials to offer? Any of those present who had not their credentials ratified at last session? If so, they will please hand them to any of the gentlemen named. While this committee is in session, is there any Unfinished Business to take up? Do you know of any, Mr. Secretary?

SECRETARY CRITCHFIELD: There is none that I know of.

The CHAIR: Will we take a recess, or go on with New Business-

SECRETARY CRITCHFIELD: Is it necessary to read the minutes? Or does the Chair want to dispense with them?

MR. HUTCHISON: I move that we dispense with the reading of the minutes of the last meeting, as they are on record.

This motion was properly seconded, and carried in the regular way.

The CHAIR: Shall we take a recess until the Committee on Credentials comes in, or shall we take up the subject of New Business?

SECRETARY CRITCHFIELD: Mr. Chairman, the Board was kind enough to accept my suggestion to dispense with the reading of the minutes, and yet there is a part of the proceedings of that meeting which I think it is well to call to the attention of this Board. Before the time of our next meeting the General Assembly of the Commonwealth will convene, and the report of the Legislative Committee was quite lengthy, and contained a number of suggestions regarding legislation that should be secured. Possibly it might be well that that report should be read now. I have copied into the minutes the report of that committee at length, because of the importance that seems to be attached to it, and because the Legislature will meet before we convene again. If it is your pleasure, I will read that part of the minutes.

The CHAIR: We shall be pleased to listen to the reading of anything which the Secretary wishes to call to our attention.

The Secretary thereupon read the report of the Legislative Committee.

MR. HUTCHISON: That report was a most excellent one, and I don't know whether we can re-consider it, or strike out anything, but that proposition which refers to the trains being late, it seems to me places this Board in rather a peculiar position. It rather spoils the rest of that good report, that we should go on record as saying that the railroad company is not just as anxious to get their trains through as we are, and it seems to me that it shows weakness on our part to go on record in that way. The Legislature would not consider anything of the kind, and, it seems to me, it weakens us to go before them with a request of that kind. I would like to have an expression of opinion about that. It may be that some of us have been riding on the Reading Railroad, and have a grievance, but I find, in traveling up and down this State that railroads are just as anxious to get their trains through, as we are to get through.

SECRETARY CRITCHFIELD: I don't believe that the railroad companies are just as anxious to get their trains in as we are to get in. The officers of the company may be, but I have an idea that if the employes of the company were as anxious, they would get in.

MR. HUTCHISON: Do you think, in your judgment, is this a matter that the Legislature would consider?

SECRETARY CRITCHFIELD: So far as that is concerned, I don't know. As I remember the wording of the report, it says that some measure of that kind would be helpful. I don't see why it would not be a good thing. I am living on a line where it is the rule to be late always, and never on time. My friend, Mr. Weller, sitting here, I don't know whether he takes the train between Johnstown and where we live, but I do very frequently, and I believe I am safe in saying that it is always from half an hour to an hour late. As the schedule says, it is necessary for a man to be on time; if he is not, the train is sure to be on time; so the man has probably to leave some of his business half done in order to be at the station at the time designated in their schedule, and then the train comes in half an hour late, while his time is worth money. Now, I don't think it places any hardship upon the railroads, unless the delay is caused by an accident, and it does seem only right and just that they should pay a man for his time. Of course, I don't know what was in the minds of the Committee when they formed that part of the report.

The CHAIR: I would like to say that I feel very strongly as does Mr. Hutchison, and if it had not been for the presence of the Governor when this report was presented, it would not have passed unchallenged. Let a proposition of this kind come from a railroad commission, but don't let the Board of Agriculture weaken its position by going before the Legislature, and asking for things of this kind. I believe there are several things in that report worthy of our attention, but I think it will weaken their effect to go before the Legislature with a thing of this kind, which has not the slightest chance of receiving any consideration from them.

MR. RODGERS: In regard to this railroad matter, I believe that the railroad company wants to get their trains through on time just as anxious as any one else. I am a passenger and I want to get through, and they want to get their trains through, and they try to do so. I have lived where I could see quite a stretch of railroad, and I have frequently seen trains held up by something that will save human lives. I know a great many conductors and engineers, and they are just as anxious to get their days' work in as any other man. Circumstances over which they have no control is what causes them to lose time. We were held up today, coming up here. Some of you may know the reason—because something was in the way that would have endangered our lives.

MR. CLARK: On our mountain roads there are frequent delays; they have got but few trains on the road, and these are usually late, and we are often seriously inconvenienced by failure to make connection. Some time ago we went to Pittsburg to see Robert Pitcairn about it. He was then Assistant to the Superintendent of the Road, and we went to see him and laid our grievance before him. His reply gives the whole thing in a nut-shell. He said, "provided there is no accident, and no heavy snows, and no freight trains ahead, you will get there on time." I said, "but the freight trains should have nothing to do with it." He said, "well, here is the whole thing; we make our money on the freight trains, and we must attend to them." "But," I said, "there are the passengers on which you charge an extra fare; you don't think it is right to hold them up for freight trains, do you?" "No, sir; very true; very true; but it is on the freight trains we make our money." So the answer we got was that except in case of accident, or trains held up by a heavy fall of snow or bridge washed away, or something of that kind, they could get their trains through on time; and on the average, they do get the through trains in on time, but the local trains have to suffer in the interest of freight trains. The money is made on freight trains, and therefore they allow passengers to suffer.

The CHAIR: Mr. Woodward, you are an old railroad man; we should be pleased to hear from you.

COL. WOODWARD: I have just come in, and do not know what is being discussed, so I am hardly in position to speak.

The CHAIR: Are there any further remarks?

SECRETARY CRITCHFIELD: If it is your pleasure that this report be amended, I don't want to stand in your way.

MR. COWAN: I move that we reconsider the report.

MR. HUTCHISON: I second that motion.

MR. McGOWAN: I would like to hear a word from the Chairman of the Legislative Committee before we adopt this.
I think that in Brother Hutchison's remarks he refers to me in his grievance against the Reading Road; that come from Berks, and it reflects on me, but I don't want to say anything so far as that is concerned; I would rather have you hear from Mr. Kahler on that point. I, myself, thought it rather a weak point to present to the State Board; I did agree to having the window open in time, and in regard to the bulletin board, but as to the matter of the lateness of the trains, it did not look to my mind as if we could carry it through.

MR. HUTCHISON: I did not refer to Brother McGowan; it was only a side remark in reference to the Reading Road, because it is an old story that their trains are always late.

There is a great deal of truth in what has been said by these friends, but when it comes to the Legislature, we should be a little slow in presenting any such thing as that. I think that we had better reconsider that part of the report.

The CHAIR: Will some one please notify Mr. Kahler that this matter is before the Board? He is in the other room with the Credential Committee.

Has any other gentleman any remarks to make in the meantime? I call on Col. Woodward.

COL. WOODWARD: I was unfortunately detained at the hotel by some gentlemen who came in to see me, and I don't know what is before the house. I thought I was at an agricultural meeting, but it appears to be a meeting of railroad men. I don't know what is before the house, therefore I can't talk.

At this point Mr. Kahler, Chairman of the Legislative Committte, came in.

The CHAIR: Mr. Kahler, the question before the Board is, as to whether it would not be advisable to reconsider that part of the report of the Legislative Committee which refers to late trains, and the railroad companies reimbursing the passengers for any time lost through such delay.

MR.KAHLER: It seems to me that it is contrary to our usual practice to reconsider anything that has been passed at a previous meeting. This report has not been presented yet to the Legislature, the Legislature not being in session.

The CHAIR: That is one reason we can reconsider it. It has not been acted upon.

MR. KAHLER: I am a little at a loss to know whether it would be in parliamentary order to reconsider it.

The CHAIR: Oh, yes; it is in parliamentary order all right.

MR. KAHLER: This Committee does not want to reconsider anything that has been presented to the Board. Personally, I don't think we could recommend anything but what I am in favor of. I think sometimes that we do not consider things well enough before starting out; some one moves to adopt a thing, and we go ahead and do it, and then act on it afterwards.

The CHAIR: At the time this report was presented, the Governor was present, and he was limited to a certain time, and nobody wanted to start a fight at that time. There are many other things in that report that are of great value to agricultural interests, but I do not think this is one of them, and the only question now is, whether we want to reconsider it. There is a motion to that effect before the house.

MR. KAHLER: I, for my part, do not think we should reconsider it.

The question was called for, whereupon the Chair put the question, and a vote was taken, which resulted in favor of reconsidering the report.

The CHAIR: Now the question is as to the adoption.

MR. HUTCHISON: I move that that part of the report which refers to the trains being on time be stricken out.

This motion was properly seconded.

The CHAIR: The question is now open for discussion.

MR. KAHLER: Read the section, please.

Secretary Critchfield read the section in question.

The CHAIR: I think that should be passed by a lawyers' convention; it would be the finest thing that they ever passed. It would fill their pockets with money.

A Member: I think if that was passed it would meet the same fate as the two-cents-a-mile rate. I think there are other things of more importance before the Board to claim out attention.

COL. WOODWARD: I should be very glad to see this motion carried. I would be very sorry to see such a recommendation come from the State Board of Agriculture, and very sorry, indeed, to see it in print. It seems to me that as a Board, we are committed to agriculture; not being railroad men, it does not seem to me that we are qualified to speak on the subject. As a boy, I was a railroad man; I was a conductor of both freight and passenger trains, and I know that every railroad man wants to see everything on time so far as is possible under every condition and circumstance, and while I do not believe in discriminating in favor of the railroads, I am in favor of giving them a fair chance, and I do not think we should meddle with this question. Others are just as much in favor of it as we are. Besides, we can't handle these people too much. I have been delayed on the road thirty or forty minutes by circumstances due to the train itself. I have known people to get on and off the train with terrific amounts of baggage, which merely putting on and off the train will delay the train forty or fifty minutes. I would not like to be a party to a report containing a clause of that kind. We would be open to a charge of trying to do impossible things and of trying to make the railroads do impossible things. I sincerely hope that this motion will be carried.

At this point Mr. Hutchison temporarily took the Chair.

MR. McHENRY: I would like to ask in what position this motion is before the Board; is it an original motion?

MR. HUTCHISON: I made a motion to strike out that clause or section referring to trains being late.

The CHAIR: Are there any further remarks? If not, we will vote on striking out that clause.

The vote resulted in favor of striking out the clause referring to trains being late.

MR. SCHWARZ: I would like to suggest another amendment. I have been for many years a friend of good roads, and have advocated them for many years. I think that part of the report commending the Highway Department is not satisfactory. There is too much dissatisfaction all over the State, and I move that the part of the report which commends the Highway Department be stricken out. I found in traveling over the State last spring, that there was a universal kick, and I don't know why we should go on record as commending something that is unsatisfactory to the people of the State. I don't say that we should condemn, but we need simply say nothing.

MR. McCREARY: I second that motion.

MR. KAHLER: I am at a loss to know what the clause is.

Secretary Critchfield thereupon read the section in question.

MR. SCHWARZ: What I mean is to simply leave out the first part in reference to commending the Highway Department.

MR. KAHLER: I don't see anything criminal in that.

MR. HUTCHISON: Simply strike out the word "commend" and begin with the next clause.

MR. THOMAS: I don't want to say that it is a good thing, but I think it is one of the best things in the report, and that what the Highway Department has done is an object lesson of very great value to the townships when they come to build roads. I live within sight of the State Capitol, but to get to it I have to pass over the worst roads in the Commonwealth. I can take you over a road in Allen township that the township built at a cost of from six to eight thousand dollars a mile, and also take you to another township a few miles away in which the macadam is in good condition, but these are the exception; they have taken an object lesson from the State Highway Department. I think this object lesson is a good one, and I think the people who have money to build roads, should have an object lesson of this kind before them, in order to learn how to build them.

MR. NAGINEY: In our part of the State, the Highway Department built a State road which cost considerable money. Now, we have our own stone crusher, and if the State will only give us the eight thousand dollars we will undertake to keep our own roads in repair with our own facilities at less expense.

MR. McHENRY: I am very much pleased at the wording "object lesson." In my part of the country they are building State roads from the borough line—about five different roads at the present time, and they would stand for an object lesson in corrugated iron. It costs us thirteen thousand dollars a mile, and it is certainly an object lesson. Give us the money; we will make better use of it.

MR. McCREARY: I endorse every word Mr. McHenry says. We have in our township some miles of State road, and I hope to be able to take this whole crowd out to some four or five miles of macadam road that was built last year. I tell you that our roads are costing us too much. You can buy gold too dear every time. Now, after you get your road, it will cost more to keep it in repair than any dirt road will cost, and the dirt road will be just as good. We have had the experience. The first half mile built in Lawrence county was built two years ago last summer, and we undertook to build two miles of that road. For some reason or other the contract was held up, and when we again got ready to build, we got word that the State Department had no money and we would have to quit. And there was another three miles and a half in our township. We had the application in for a year, and while there was no money to build our road, there was money to build the Harlansburg road. Now, the road we have cost a little less than five thousand, and it is a good road, but it won't last. And speaking of that first half mile, about the time everything was done, it needed repairs; I was one of the auditors of the township, and I said to the contractor, "make an estimate of what the repairs will cost"; he said about seven hundred. Now, that road cost us four thousand dollars two years ago; these contractors don't care. If you want to put down anything, put down brick pavements; it will only cost about sixty cents, and will last a thousand years.

MR. KAHLER: What else is said about roads? It seems to me we are forgetting about commending the Department. Now, no doubt there have been defects in this road business, but they have tried to remedy these defects.

SECRETARY CRITCHFIELD: Now, for the benefit of Mr. Kahler, and those interested, if this amendment prevails the words to be stricken out are, "that we also commend the work of the State Highway Department for the good work that has been accomplished in giving the farmers of this Commonwealth," etc., and then, "we regret that our Governor considered it his duty to cut down our appropriation from three million to one million," etc.

MR. SCHWARZ: Mr. Chairman, I think that would be exactly right. I only want to say that the county of Lackawanna refused to pay twenty-three thousand dollars for the building of such a road, and the courts upheld them and issued a permanent injunction, because the road was a miserable thing, and went to pieces in three years, and I again ask that this phrase of commendation be stricken out.

MR. YOUNG: I want to say that the entire work of the State Highway Department has been vile. This commission won't do good work; if they do good work, let us commend it; if they do vile work, let us condemn it.

MR. THOMAS: We are asked to strike out the part of this report commending the work of the Highway Department, and expressing regret that the Governor deemed it advisable to cut down the appropriation for good roads. He explained to us last year why he did this. Now, the Highway Commission built two roads in our township, and one is a good road, although I can show you some others that are miserable. This is a good one, but the point of the thing is to distribute the money so that we can do it ourselves. If these roads are not built carefully and properly, what is the use of the township squandering money? Opinions differ as to whether townships can build good roads; I can point you to some that can't; but it seems to me that the point is to get the money so distributed that those who can build good roads will be able to do so.

MR. WELLER: It seems strange that we have been able to build good roads for a hundred years, and now have to get down to this system. The system is wrong. Now, the State is not going to hand down this money to the townships, and let them spend it without supervision. Take my home township; the roads are not as good as twenty years ago, but I think the work of the Highway Department in some places should be commended. Now, there is no doubt that some townships can build good roads if they have the money, because they have tried it, and have done it; in others they cannot do it. Now, it is better to build slowly if necessary, and build good; better make a mile of road, and make it good, if it takes half a century than to build a good many miles in a year, and have it go to pieces.

MR. TAYLOR: This road question is a question for the farmers of Pennsylvania. We have had some roads built in our county by the State Highway Department of Pennsylvania; we have two sections built in our township. One of them we can commend; the other we must condemn. The one road, which has been in use about two years, has cost about one-third of the original cost in repairs, while the other is in excellent condition, and has cost but little for repairs. I think the money expended by the Highway Commission is not properly expended. I think the object is all right, but the men who expend it on our roads do not apply it properly. Then we have another system of roads in our county which we must condemn utterly; it is called the Flinn road. Some of it is very bad. Last spring Dr. Armsby and I drove over that road, and he was surprised to learn that it cost from sixteen to seventeen thousand dollars a mile. Our township was thirty-three hundred and thirty dollars in debt last year. This year we have recovered about two hundred dollars, but the roads are in a worse condition than ever. Now, I think this amendment is all right, and I will vote for it.

SECRETARY MARTIN: I can think of no body of men in Pennsylvania whose counsel and advice would go farther than that of the State Board of Agriculture; hence I should counsel a most careful deliberation on a resolution of such vast importance as the one before you, and would suggest that no action be taken by this convention, but that a committee be appointed to very carefully consider the proposition that has been set forth here and prepare a set of resolutions to present to the Legislature which will entitle every one of them to undivided attention. My friends, the question of public highways, permanent highways, is before us today, and it is our duty to present to the legislative power of the State such suggestions as will be most productive of the greatest good to the greatest number. In my judgment, it would be no reflection to the great Road Commission of the State to suggest that they exercise more discretion, and critical discernment in regard to the roads of Pennsylvania. I say this in no spirit of censure. The work is a great one, and demands that it be done in a spirit of earnestness. If the Commission has made mistakes, let us point them out kindly, in a manner that will command consideration, and thus aid in producing roads that will be a credit to the great State of Pennsylvania. If my suggestion is of any value today, I would say, appoint a committee of thinking men to prepare a resolution that can come with dignity and courtesy from this Board.

MR. KAHLER: I want to say that I spoke to the Road Commissioner, and asked him if he had any objection to it, and he said he had not. Now, our county took eighteen months to decide whether they wanted to build this road. It is something like "pigs in clover," you get one in, and then you get two out. One head is better than four or five.

MR. McGOWAN: I just want to say one word; in voting this resolution down, it strikes me it will result in greater harm than good. We have the State Department of Agriculture antagonizing another State Department, and as long as we show antagonism, not much good will result. It will be against us in the entire State Department, this antagonism of the State Board to another State Department. There are a whole lot of things not right; of course, we all know that; but it does not strike me as the right time to arouse antagonism.

A Member: The sooner we get ready to do a thing we want to do, the better.

MR. SCHWARZ: I want to ask the brother whether he wishes to let it stand that we commend the work of the Highway Department?

MR. McGOWAN: Yes; I believe it should remain at this time.

MR. HERR: I rise to commend the suggestion of Secretary Martin; I don't believe we should do anything hasty. I am something like the old darkey preacher; he told his hearers: "Now, my bredren, dere is a broad way, and dere is a narrow way; de narrow way is de straight way, and it leads to hebben; be broad way am de crooked way, and it leads to perdition; now, in dat case, dis darky takes to de woods." Now, I think the best thing to do would be to lay the whole thing on the table and appoint a committee to prepare a resolution to be presented to the Highway Commissioner. We are all interested in the Highway Department, as that is really a part of our agricultural work, and I should just like to make a motion to lay this subject on the table.

MR. HUTCHISON: That would lay the whole report on the table; there is a motion before the house to strike out a clause.

MR. HERR: Let us take it up.

MR. McHENRY: I move that we refer this whole matter back to the Legislative Committee for revision, and have them report at our next meeting.

MR. HERR: I second that motion.

MR. SCHWARZ: I withdraw my amendment in favor of Mr. McHenry's motion.

A vote on Mr. McHenry's motion to refer the whole matter back to the Legislative Committee for revision resulted in its adoption.

MR. McHENRY: There is another clause in that report for which I would ask a second reading; it is in reference to local option.

The CHAIR: The whole matter was referred back to the Committee on Legislation.

MR. HERR: The Committee on Credentials reports as follows:

REPORT OF CREDENTIAL COMMITTEE.

The Committee on Credentials respectfully submit the following report: The credentials of John C. Weller, of Somerset county, N. F. Bartley, of Butler county, and Howard Cox, of Blair county, have been examined and found in proper form and recommend they be accepted.

J. A. HERR,
A. J. KAHLER,
M. M. NAGINEY,
Committee.

The CHAIR: You have heard the report; what is your pleasure?

On motion, properly seconded, the report was unanimously adopted.

MR. BARNES: I think it would be a good idea for the Secretary to call the roll again. There have been a number of members come in since the opening of the session.

The Secretary called the roll for the second time.

SECRETARY MARTIN: Before adjournment, with your permission, I would announce the first session of our meeting this evening. The hour for convening is 7.30, Mr. McHenry presiding, and the address of welcome will be delivered by Judge Porter. We feel very glad that the Judge has consented to speak to us this evening. He will be followed by Secretary Critchfield, and then

Dr. Hunt will speak to us on a subject of interest to all of us. Now, I bespeak for this first session the attendance of all members who are upon our list. I am certain you will all be well paid for coming; I know of nothing of greater benefit to persons interested in agriculture than the program we have before us.

MR. HUTCHISON: We are very glad to know that you have good farming in this part of the State; it has always been the opinion of those of us from the eastern part of the State that we were the only ones who knew anything about farming.

I see Judge Porter is now with us, and I shall be glad to have him rise, so that you can all see him, and meet him.

JUDGE PORTER: If the Farmers' Institute is made up of such men as Mr. McCreary and Mr. Martin, I have no doubt you will be perfectly safe while you are here.

I was interested in the proceedings of this afternoon, particularly in the question of good roads. While we do not give this question the attention we should, there is no question in my mind, but that it is a most important one.

Of course, in some districts you will find some difference between the farmer and those who reside in the city, which is, to my mind, unjustifiable, but if the question of good roads is an important one to the city, it is a most vital one to the farmer, and I listened with a great deal of interest to your discussion of the subject.

MR. TAYLOR: Mr. Chairman, is it not customary where there are delegates sent in by an Agricultural Society to give them a seat.

The CHAIRMAN: It is.

MR. TAYLOR: We have with us Mr. A. S. Hays of the Union Agricultural Society of Washington county; I move that he be given the privilege of the floor.

This motion was properly seconded, and regularly adopted.

MR. SCHWARZ: I move that all the ladies present be elected Associate Members, with the privilege of the floor at any time, and a list of their names be included in the publication of the bulletin.

This motion was properly seconded and regularly carried.

The ladies in attendance were: Mrs. A. L. Martin, Mrs. C. W. Brodhead, Mrs. Mollie McLaughrey Allen, Mrs. Howard G. McGowan, Mrs. M. N. Clark, Mrs. Sarah B. Fritz Ziegler, Mrs. L. W. Lighty, Mrs. Mary A. Wallace, Miss E. Belle Greist, Mrs. Peter B. Cowan, Mrs. J. F. Seavy, Miss Young, Mrs. W. E. Perham, Mrs. R. W. Weld, and Mrs. E. C. First.

MR. MARTIN: I would say that Judge Porter has very kindly consented to open the room to the right for the use of the different committees.

The CHAIR: If there is no further business, the meeting stands adjourned until the Annual Meeting of the Board next January.

N. B. Critchfield

Secretary.

LIST OF COUNTY INSTITUTE MANAGERS FOR SEASON OF 1907-8.

County.	Name and Address of Chairman.
Adams,	A. I. Weidner, Arendtsville.
Allegheny,	J. S. Burns, Imperial, R. F. D. No. 1.
Armstrong,	S. S. Blyholder, Neale.
Beaver,	A. L. McKibben, New Sheffield.
Bedford,	W. Clay Lutz, Bedford.
Berks,	Howard G. McGowan, Geiger's Mills.
Blair,	H. L. Harvey, Juniata.
Bradford,	Erwin Platt, Wysox, R. F. D.
Bucks,	Watson T. Davis, Ivyland.
Butler,	W. H. H. Riddle, Butler.
Cambria,	H. M. Gooderham, Patton, R. F. D. No. 1.
Cameron,	W. H. Howard, Emporium.
Carbon,	R. A. Eroh, Weatherly, R. F. D. No. 1.
Centre,	John A. Woodward, Howard.
Chester,	Dr. M. E. Conard, Westgrove.
Clarion,	S. X. McClellan, Knox.
Clearfield,	E. M. Davis, Grampian.
Clinton,	Joel A. Herr, Millhall, R. F. D.
Columbia,	A. P. Young, Millville.
Crawford,	J. F. Seavy, Saegerstown.
Cumberland,	Rev. T. J. Ferguson, Mechanicsburg.
Dauphin,	S. F. Barber, Harrisburg.
Delaware,	R. M. Heyburn, Ward.
Elk,	J. B. Werner, St. Marys.
Erie,	Archie Billings, Edinboro.
Fayette,	Sylvester Duff, Smock.
Forest,	C. A. Randall, Tionesta.
Franklin,	J. P. Young, Marion.
Fulton,	J. L Patterson, McConnellsburg.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	G. G. Hutchison, Warrior's Mark.
Indiana,	J. K. McElhoes, Home.
Jefferson,	Peter B. Cowan, Brookville, R. F. D. No. 4.
Juniata,	Matthew Rodgers, Mexico.
Lackawanna,	Horace Seamans, Factoryville.
Lancaster,	J. Aldus Herr, Lancaster, R. F. D. No. 4. E. S. Hoover, Lancaster. Neal Hambleton, Wakefield.
Lawrence,	Saml. McCreary, Volant, R. F. D.
Lebanon,	Edward Shuey, Lickdale.
Lehigh,	P. S. Fenstermaker, Allentown.
Luzerne,	J. E. Hildebrandt, Dallas, R. F. D.

County.	Name and Address of Chairman.
Lycoming,	A. J. Kahler, Hughesville.
McKean,	L. W. Howden, Coryville.
Mercer,	W. C. Black, Mercer.
Mifflin,	M. M. Naginey, Milroy.
Monroe,	Randall Bisbing, East Stroudsburg.
Montgomery,	Jason Sexton, North Wales.
Montour,	C. A. Wagner, Ottawa.
Northampton,	Wm. F. Beck, Easton, R. F. D. No. 4.
Northumberland,	I. A. Eschbach, Milton, R. F. D. No. 1.
Perry,	A. T. Holman, Millerstown.
Philadelphia,	J. B. Kirkbride, Bustleton.
Pike,	B. F. Killam, Paupack.
Potter,	Horace H. Hall, Ellisburg.
Schuylkill,	W. H. Stout, Pinegrove.
Snyder,	Chas. Miller, Salem.
Somerset,	Jacob S. Miller, Friedens.
Sullivan,	E. R. Warburton, Campbellville.
Susquehanna,	F. A. Davies, Montrose.
Tioga,	F. E. Field, No. 209 Caldwell Ave., Elmira, N. Y.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	Geo. A. Woodside, Sugargrove.
Washington,	D. S. Taylor, Burgettstown, R. F. D. No. 2.
Wayne,	W. E. Perham, Niagara.
Westmoreland,	M. P. Shoemaker, Greensburg.
Wyoming,	D. A. Knuppenburg, Lake Carey.
York,	G. F. Barnes, Rossville.

LIST OF INSTITUTE LECTURERS FOR SEASON OF 1907-8.

Allen, Mrs. Mollie MacClaughry, Oswego, N. Y., R. F. D. No. 6.
Barber, F. S., Harrisburg, Pa.
Barclay, Richard D., Haverford, Pa.
Bashore, Dr. Harvey B., West Fairview, Pa.
Beardslee, R. L., Warrenham, Pa.
Black, W. C., Mercer, Pa.
Bond, M. S., Danville, Pa.
Brodhead, Mrs. C. W., Montrose, Pa.
Brodhead, C. W., Montrose, Pa.
Bruckart, C. W., Lititz, Pa.
Burns, J. S., Imperial, Pa., R. F. D. No. 1.
Campbell, J. T., Hartstown, Pa.
Carr, Prof. M. Earl, Bureau of Soils, Dep't. of Agriculture, Washington, D. C.
Clark, M. N., Claridge, Pa.
Cox, John W., New Wilmington, Pa.
Cure, Z. T., Jermyn, Pa.
Detrich, Dr. J. D., 438 Adams Avenue, Scranton, Pa.
Drake, W. M. C., Volant, Pa.
Eschbach, I. A., Milton, Pa., R. F. D. No. 1.
Fassett, F. H., Meshoppen, Pa.
Frear, Dr. Wm., State College, Pa.
Fritz, Mrs. Sarah B., Duncannon, Pa.
Funk, Dr. J. H., Boyertown, Pa.
Grim, Wm. H., Hamburg, Pa.
Hall, Horace H., Ellisburg, Pa.
Herr, Joel A., Millhall, Pa., R. F. D.
Hertzog, P. H., Division of Zoology, Harrisburg, Pa.
Hill, W. F., Huntingdon, Pa.
Hoover, E. S., Lancaster, Pa.
Hull, Geo. E., Transfer, Pa., R. F. D.
Kahler, A. J., Hughesville, Pa.
Kester, R. P., Grampian, Pa.
Ledy, J. H., Marion, Pa.
Lehman, Amos B., Fayetteville, Pa.
Lighty, L. W., East Berlin, Pa.
Mairs, Prof. T. I., State College, Pa.
Massey, Prof. W. F., Salisbury, Md.
McConnell, Prof. W. R., State College, Pa.
McDowell, M. S., State College, Pa.
Menges, Prof. Franklin, York, Pa.
Miller, Prof. Norman G., Marion, Pa.
Northup, Henry W., Dalton, Pa., R. F. D. No. 1.
Owens, Prof. Wm. G., Lewisburg, Pa.
Peachey, J. H., Belleville, Pa.
Philips, Hon. T. J., Atglen, Pa.

Phillips, E. L., New Bethlehem, Pa.
Pillsbury, Prof. J. P., State College, Pa.
Reed, Chas. Allen, Washington, Pa.
Satterthwait, A. F., Division of Zoology, Harrisburg, Pa.
Schwarz, Hon. R. F., Analomink, Pa.
Schock, Oliver D., Asst. Dairy and Food Commissioner, Harrisburg, Pa.
Seeds, Robert S., Birmingham, Pa.
Shelly, Jere, Dover, Pa. R. F. D.
Smith, J. O. Calvin, Pa.
Stephens, A. W., Lewisburg, Pa.
Stout, W. H., Pinegrove, Pa.
Thayer, Dr. I. A., New Castle, Pa.
VanNorman, Prof. H. E., State College, Pa.
Wagner, F. J., Harrison City.
Wallace, Mrs. Mary A., Beechwood and Shaw Aves., Pittsburg, Pa.
Watts, Prof. R. L., State College, Pa.
Watts, D. H., Kerrmoor, Pa.
Waychoff, G. B., Jefferson, Pa.
Weld, R. J., Sugargrove, Pa.
Wolff, Wm. H., West Chester, Pa.
Wood, J. C., Shawnee, Pa.
Woodman, Paul, Rushland, Pa.
Wittman, W. Theo., Allentown, Pa.

MEETING OF FARMERS' ANNUAL NORMAL INSTITUTE.

PROGRAM.

First session convenes Tuesday Evening May 26, 1908.

MR. SAMUEL McCREARY, Volant, Pa., Chairman.

Call to order 7.30.

Address of Welcome by Hon. W. E. Porter, Judge of the Courts, New Castle, Pa.

Response, by Hon. N. B. Critchfield, Secretary of Agriculture, Harrisburg, Pa.

I. "NEW PLANS OF SOIL INVESTIGATION."
Dr. Thomas F. Hunt, State College, Pa.

Wednesday Morning, May 27, 1908.

MR. H. M. GOODERHAM, Patton, Pa., Chairman.

Call to order 9.00.

1. "VETERINARY SANITARY WORK."
Dr. Louis A. Klein, Deputy State Veterinarian, Department of Agriculture, Harrisburg, Pa.

2. "SOIL RESOURCES AND THEIR UTILIZATION."
Prof. M. Earl Carr, Bureau of Soils, U. S. Dept. of Agri., Washington, D. C.

3. "THE ACRE AND THE MARKET."
Dr. J. D. Detrich, Dean of Agriculture, Scranton Correspondence School, Scranton, Pa.

Wednesday Afternoon, May 27, 1908.

MR. W. C. BLACK, Mercer, Pa. Chairman.

Call to order 1.30.

1. "SOME ESSENTIAL PRINCIPLES IN THE PRACTICE OF MARKET GARDENING."
Prof. R. L. Watts, State College, Pa.

2. "FRUIT RAISING IN PENNSYLVANIA, PAST AND FUTURE."
Dr. J. H. Funk, Boyertown, Pa.

3. "WHY WE GET POOR HATCHES, WEAK STOCK AND DISAPPOINTMENT MOSTLY OUT OF OUR POULTRY."
W. Theo. Wittman, Allentown, Pa.

Wednesday Evening, May 27, 1908.

MR. A. L. McKIBBEN, New Sheffield, Pa., Chairman.

Call to order 7.30.

1. "FOODS AND DIETETIC VALUES."

Mrs. Sara Walrath Lyons, No. 231-241 W. 39th Street, New York City. (Illustrated with lantern slides.)

2. "THE MOST USEFUL SCHOOL IN THE COUNTRY." (Illustrated with lantern slides.)

Dr. D. J. Crosby, U. S. Department of Agriculture, Washington, D. C.

GENERAL FARMERS' INSTITUTE SESSION.

Thursday Morning, May 28, 1908.

MR. JOEL A. HERR, Millhall, Pa., Chairman.

Call to order 9.00.

1. "BENEFITS TO BE DERIVED FROM FARMERS' INSTITUTES."

Mr. Robt. S. Seeds, Birmingham, Pa.

2. "OVERCROWDED HALLS AND PRECAUTIONS FOR SAFETY OF AUDIENCE." Opened by J. H. Peachey, Belleville, Pa. (15 minutes and 20 minutes for discussion.)

3. "SHOULD QUESTIONS FOREIGN TO EDUCATIONAL MATTERS BE TAKEN UP AT THE EDUCATIONAL SESSION?" Opened by Mr. L. W. Lighty, East Berlin, Pa. (15 minutes and 20 minutes for discussion.)

4. "WHAT RECOGNITION SHOULD BE GIVEN TO MUSIC AT THE INSTITUTES?" Opened by Mr. Joel A. Herr, Millhall, Pa. (15 minutes and 20 minutes for discussion.)

5. " WHO SHOULD HAVE CHARGE OF ARRANGING THE PROGRAM FOR THE DIFFERENT COUNTY INSTITUTES?" Opened by Mr. Geo. A. Woodside, Sugergrove, Pa. (15 minutes and 20 minutes for discussion,)

6. "SHOULD THE ONE-DAY INSTITUTE BE ABANDONED?" Opened by Hon. T. J. Philips, Atglen, Pa. (15 minutes and 20 minutes for discussion.)

7. "HOW CAN WE MAKE OUR INSTITUTES MORE HELPFUL TO THE FARMERS?" Opened by Mr. H. W. Northup, Dalton Pa. (15 minutes and 20 minutes for discussion.)

8. "MOVEABLE SCHOOLS OF AGRICULTURE." Opened by Hon. A. L. Martin, Director of Institutes, Harrisburg, Pa.

Note.—Institute Managers and Lecturers are expected to join in a free discussion of the above and such topics as relate to the advancement of institute work throughout the State.

Thursday Afternoon, May 28, 1908.

MR. S. S. BLYHOLDER, Neale, Pa., Chairman.

Call to order 9.00.

1. "BARN MANURES; THEIR TREATMENT AND APPLICATION TO THE SOIL."
Prof. Chas. E. Thorne, Director, Ohio Experiment Station, Wooster, Ohio.

2. "THE GROWING DEMAND FOR WHOLESOME MILK."
Prof. H. E. VanNorman, State College, Pa.

3. "SANITATION ON THE FARM."
Prof. Wm. G. Owens, Lewisburg, Pa.

WOMAN'S SESSION.

Thursday Evening, May 28, 1908.

MRS. MARTHA E. MARTIN, Harrisburg, Pa., President.

Call to order 7.30.

1. "THE FARMER OF THE FUTURE IN THE CHILD OF TO-DAY."
Mrs. Sarah B. Fritz-Zeigler, Duncannon, Pa.

2. "THOUGHTS OF THE HOUSE MOTHER."
Mrs. Mary A. Wallace, Beechwood and Shaw Aves., Pittsburg, Pa.

3. "BEAUTIFYING THE FARM AND VILLAGE HOME."
Mrs. C. W. Brodhead, Montrose, Pa.

4. "THE SANITARY HOME."
Mrs. Mollie MacLaughry Allen, Oswego, N. Y., R. F. D. No. 6.

Friday Morning, May 29, 1908.

MR. J. F. SEAVY, Saegerstown, Pa., Chairman.

Call to order 9.00.

1. "THE MARKET TYPES OF HORSES."
Dr. Carl W. Gay, in charge of Horse Breeding, State Livestock Sanitary Board, Philadelphia, Pa.

2. "OBSERVATION OF LARGE YIELDING WHEATS UNDER GOOD AND POOR CULTIVATION."
Prof. Franklin Menges, York, Pa.

3. "SOME FACTS A SUCCESSFUL DAIRYMAN MUST KNOW."
Dr. M. E. Conard, Westgrove, Pa.

Closing Remarks and Adjournment.

PROCEEDINGS OF THE FARMERS' ANNUAL NORMAL INSTITUTE, HELD IN THE COURT HOUSE, NEW CASTLE, PA., MAY 26-29, 1908.

New Castle, Pa., May 26, 1908, 7.30 P. M.

SCRETARY MARTIN: It is a pleasure to me to open this, our Annual Normal Institute. I have nothing of importance to announce at this time further than to say that our program is a full one. We have on this program an address of welcome by Judge Porter, a response by Secretary Critchfield, and an address by Dr. Hunt, of State College, on "New Plans of Soil Investigation"—a subject of interest to every tiller of the soil. The evening exercises will be presided over by Mr. McCreary, Chairman of Institutes for Lawrence County. Mr. McCreary will please come forward and take the Chair.

The CHAIR: The first thing on the program this evening is an address by Judge Porter, whom I am pleased to introduce to you.

ADDRESS OF WELCOME.

BY HON. W. E. PORTER, *Judge of the Courts, New Castle. Pa.*

Mr. Chairman, Ladies and Gentlemen: In behalf of the citizens of Lawrence county, I extend to the Farmers' Annual Normal Institute a most hearty welcome. We appreciate, ladies and gentlemen, the honor you have conferred upon our county and upon our city in selecting this as your meeting place at this time. It must have been a kindly sentiment, indeed, gentlemen, that led you to select this place for your meeting, situated as it is on the western border line of our State, and requiring long travel on the part of many of you to reach us. During the sessions of your Institute, we would be very glad to have you drive out into the surrounding country and see our farms, which we believe to be as fertile as any in the Commonwealth, and meet our farmers who pride themselves upon their proficiency, and the citizens of the city, who pride themselves no less upon fine farms than upon our prosperous and great city of forty thousand population. Our mills and factories are veritable bee-hives of industry. It is true that the sun is very frequently obscured by smoke, but this smoke is our pride, and this cloud of smoke by day, and pillar of fire by night, is the source of our prosperity, and it is with contentment that we can lie down and hear at night the throbs of our ponderous engines. We appreciate the honor of your meeting with us at this time; we are glad to have you here to discuss those questions which should make a success for the farmers of our State. In all our great American plans for the development of our cities, we often forget that unless the farmer succeeds, our national success will go to nothing.

It sometimes comes to me that we are not retaining as many men on the farm as we should. There are too many leaving the farm and going into the cities; this is often due to lack of knowledge as to what a farm can be most profitably adapted to. There is not sufficient time taken to instruct the rising generation in the dignity of farm life, and the opportunity on the farm for culture and refinement. It is a fact that we often find men believing that little education is needed on the farm, and that farmers, like Topsy, simply "grow." But this is a mistake; there is no vocation in which education is of more value than it is to the farmer. How many of our teachers ever think of talking to their classes about Botany, or interesting them in the things that surround them on the farm? And it is the same with the father and the mother. The boy does not take a proper part in the management of the farm. You all remember how proud you were, as a boy, when you were entrusted with some business transaction by your father, and how careful you were to attend to it, and how proud you were when your father and mother said you had attended to it as well as they could have done? The boy and girl in every family likes to attend to business matters on the farm, and in order to keep the boy and girl on the farm, you want to take them into partnership, and make them think that their success is your success. Allow them to have something of their own on the farm. We hear a great deal about making the farm a success, but instead of teaching manual training in the schools, why not teach the boy how he can grow cabbage or corn or potatoes? Let the boy and girl take interest in the raising of the animals on the farm.

As I said a moment ago, conditions are frequently responsible for the boy and the girl leaving the farm as soon as they arrive at the age of twenty-one years. To my mind, there is too much drudgery in it. You will see the sixteen-year-old boy trudging out to the fields as soon as the eastern sky is brightened by the rising sun. He is going out to feed and harness the working horses for a hard days' work in the fields, for which he will not get a cent. How can you expect to keep a boy on the farm whom you do not take into partnership with you? Give him some responsibility, and let him make a success of it. He has the fire and the energy to make a success of something, and if you do not help him, and keep him interested, you will soon find that while he is following the plow lines, on his fathers' farm, he is wondering how soon he will be twenty-one so that he can go to the city to make money for himself. So take the boy and girl into partnership; make them feel that there are responsibilities resting on them and give them some of the profit of the farm. There is no way I know of in which you can keep this sentiment in the boys and girls, as to give them something of their own to look after, and allowing them to have something out of what they make. What a spectacle, gentlemen! The boy has been raised on the farm, and has worked hard, but he has no interest in the profits of the farm. He has labored hard on the farm up to the time of his majority, without receiving any remuneration therefor except such food and clothing and washing as his father and mother saw fit to give him. He works on the farm, but his father plans everything in regard to the management of it. When he arrives at the age of twenty-one, he will probably desert the farm, or, if his devotion to his parents is so great that when he sees the silver threads, he will not desert them, but continues to work on the farm. What a spectacle is this! When he arrives at the age of maturity he has accumulated nothing of his own, and only waits for his parents to die so that he may come into his own. Is it not proper that he should be taken into partnership in order that he may reap some benefit for the many years he has devoted to the farm?

I have probably deviated from the subject, gentlemen, in making an address of welcome, and gone into a matter that has sometimes impressed me very strongly as I have seen young men who were able to make a succes on the farm, go into our cities and not make a great success. It has impressed me, gentlemen, and I have thought that during your considerations of how to make farming profitable, you might take into consideration the question of how to raise farmers on the farm. Sometimes the farmer thinks that when he has succeeded in raising a good preacher, doctor, or lawyer, he has placed his boy upon the broad highway to success, but you should know, gentlemen, that some of the noblest characters are found back on the farm. There men are produced who have time to reflect on great questions, and noble characters and great success it attained. And when I say "success" I do not necessarily mean dollars and cents, because a man may be very wealthy, and yet be a great failure, and I say that back on the farm some of the greatest successes of human life are attained, and if during your deliberations here you have any time to give to the consideration of the boy and girl on the farm, you will have taken, to my mind, a step in the right direction.

So then, ladies and gentlemen of the Farmers' Annual Normal Institute, I again extend to you, on behalf of the citizens of our county and city, a most hearty and sincere welcome.

The CHAIR: The response to this able address of welcome will now be made by our Honorable Senator Crichfield, Secretary of the Department of Agriculture of the Commonwealth.

RESPONSE TO THE ADDRESS OF WELCOME.

By Hon. N. B. Critchfield, *Secretary of Agriculture, Harrisburg.*

Mr. Chairman, Judge Porter, and Citizens of New Castle and of Lawrence County: It is very gratifying to me, and to those who are here with me to be assured of the cordial welcome, so forcibly and earnestly expressed in the address to which we have just listened, In coming to your beautiful city, we were all impressed with the thought that we were about to cast our lot for a few days among a generous and hospitable people. Notwithstanding the fact that many of us have never been here—I know that there are a number of members of our Board who have never visited New Castle—we do not feel that you are strangers to us, or we to you. We have known something of your people; they have been represented upon our Board for a number of years. "By their fruits ye shall know them," is one of the sayings of Him whose sayings always were and always will be true, and judging by the character of the men you have sent to represent you on our Board, we cannot help thinking that this community, and that Lawrence county must be made up of ladies and gentlemen. And so we are glad to be here, and we are glad to hear these cordial, earnest words of welcome, and we appreciate them because we know they come from people who are worthy of being recognized as friends.

The Chairman, Mr. McCreary, will excuse me for speaking of him personally. It just now comes to my mind that nearly a quarter of a century ago, when I first came into the State Board of Agriculture, as a representative of my own county of Somerset, one of the first men, and perhaps the very first man, to bid me welcome was Samuel McCreary of Lawrence county. I remember just as well as if it were today, in the old Supreme Court Room at Harrisburg, when I felt very young—a good deal younger than I am now, and a good deal younger than I really was,—I was twenty-five years younger, and I felt a great deal younger, because I did not then have the experience with public men, and in public life that I have since acquired—and I felt it thrill my heart when Samuel McCreary came across that great room, and reached out his big, broad hand, broadened and hardened by honest labor, and told me I was welcome. I don't know, Mr. McCreary, whether you remember it, but when we came back, you were going to New Castle and I to Johnstown, we sat together and talked all the way, and I felt then, and feel yet, that I was the better for having met him. And then, succeeding him, we had a man by the name of Johnson, a good, earnest worker—I met his brother here tonight—always ready to lay his hand to anything that would further the interests of agriculture in Pennsylvania. And then, sir, we are not forgetful of the fact that our Mr. Martin, whom we are proud to recognize among our friends, and as Director of Institute work for the past ten years—we don't forget that he came from Lawrence county.

We are glad to be with you, and we are glad, as I have already said, to hear these earnest, cordial words of welcome, and I hope that when the labors of the week are ended, and when this able program that has been prepared has all been gone over with, and we come to take our departure, we shall go away with very pleasant feelings and memories of the citizens of New Castle and of Lawrence county, and I hope that you and your people will feel that some little good has come to you because of your association with us.

Now, Mr. Chairman, I do not intend—in fact, I did not intend to make a speech at all, when I got up. I am not a speech-maker, anyhow, and when Mr. McCreary said he was going to put me on the program, I demurred, but, as you all know, most of us like to see our names on the program, and I did not say very much. I was like the darky, who, when he was asked, "Sam, can you change me five dollars"? said, "No, boss, I have no five dollars, but I thank you for the compliment all the same." So, while I did not intend to make a speech, I was proud my name was there, and I feel very much obliged to Mr. McCreary.

What I pretty nearly forgot to say was that we heads of Departments sometimes work by putting other people to work. We are obliged to have our assistants. What would I do, for instance, with a great, big department of six divisions on my hands, with every one of them nearly as large as the State Government, if it were not for my assistants? We have our assistants, and we have one of them in the audience tonight, who learned to talk when he was young. He was brought up on the farm, married a farmers' daughter, who made him a first-rate farmers' wife, and he has always been a farmer, lending his best efforts to the State Board of Agriculture. Two years ago I found it necessary to make a lawyer of him, and in the interests of agriculture, I have given him a license to practice in the offices of Justices of the Peace, and the Courts of Pennsylvania. You all know how lawyers can talk; why, I am told that a great many of them live by talking; I have never been one; at least, I have never been charged with it. Why, they can talk upon all questions, and upon all sides of the question at once. So I am going to call on this lawyer whom I have made myself—and therefore I know he is all right—to talk to us a little. I am going to call on Mr. Hutchison.

ADDRESS.

By Geo. G. Hutchison, *Warriors' Mark' Pa.*

Mr. President, Hon. W. C. Porter, Judge of the Courts of Lawrence County, Ladies and Gentlemen: I never disobey orders when I am commanded by a superior officer to perform a duty, but tonight I feel that I am not competent of filling the place of our honored Secretary, but, with your indulgence, I will endeavor to say a few words in response to the eloquent and hearty address of welcome that we have received from this distinguished son and citizen of the county of Lawrence.

Pennsylvania is divided into two distinct parts by a range of mountains known as the Alleghenies. For a number of years this organization has been meeting east of this range of mountains, but on the invitation of our fellow member of the Board, and Institute worker, Hon. Samuel McCreary, of this county, we almost unanimously accepted your invitation to hold our annual meeting in this city; feeling that we would, by doing so, pay a visit to a section of Pennsylvania, that those living in the east and central part of the state knew very little about, especially in regard to agriculture, and by visiting your beautiful city we would get new ideas and understand better your ways of following this noble calling. It has been my privilege to visit your city on a number of occasions, and to see the thrift and enterprise that is here manifested. You have here some of the best manufacturing interests in Pennsylvania, located outside of the great city of Pittsburg. The products from these plants go to all sections of the world; this has made you a great manufacturing center. It was a pleasure to the members of the Board to behold the pall of smoke; they said "times are good here;" that is evident. We object to the smoke sometimes, but these last six months people would have been only too glad to do a little more washing. But the audience that is present this evening will look more at your broad acres and your beautiful buildings and improvements. You have also produced here in this valley, great men. Men who have gone out to make the State better and build it up. You have done your share in this section towards preserving the Union, and as we come into your city, we observe a monument towering toward heaven, that has been erected by your patriotic citizens, in remembrance of those who went from this county to help preserve this glorious country of ours. This is a fit tribute to those men, and it shows that you have men living today in your midst who have not forgotten those who left home and all that was near and dear to them to sacrifice their lives that we today might live and enjoy this heritage. Monuments of this kind should be erected in each county in our commonwealth, and I am glad to note, as I get out through the State, that a spirit of this kind is being manifested by our citizens, and a number of counties have monuments similar to the one we have been privileged to look upon in your city.

But among the greatest monuments that any State can erect is that of fine farms on which are erected good buildings and good improvements, and acres well tilled. This is a monument that will be lasting.

I know you are good farmers out here; the only trouble is that you grow too many politicians, because you are too near the State of Ohio, and you have at least one man who favors Bryan.

In responding to this address, you may ask, who is this body of men who come to hold its annual metting in your city, and what is their business? And you have a right to know, and if you will indulge me a few minutes, I will try to give you some information in regard to the business that brings us here. First, if you will take the program, you will see that we have a meeting of the State Board of Agriculture, and a stranger will say, "What is that?" That is an organization, which was established under an act of Assembly of your State, that has been existing since 1876. It has a representation from each county, or a membership of 67, besides three members that are appointed by the Governor and one by the State Poultry Association. Then we have members who are ex-officio, who are as follows: The distinguished Governor of our State; the world wide known Henry Houck, Secretary of Internal Affairs; the great educator, Dr. Schaeffer; the new President of State College, Dr. Earl Sparks, the gentleman who will take charge of that institution next June, from whom we expect great things; the honest and able Auditor General, Robt. K. Young, and our very efficient Secretary of Agriculture, Mr. Critchfield. Mr. Critchfield has a long record that would take me most of the evening to recite, the positions he has filled in Pennsylvania, and the work that he has done to make our State better along agricultural lines; but I will say this, that in all the positions he has been placed, he has made good. The Board has been working along agricultural lines in their respective counties in the State in the Farmers' Institute work.

The next organization that meets with you is the one headed by your distinguished fellow-citizen, Hon. A. L. Martin. This gentleman is well known to you. You honored him by electing him for three terms to the Legislature, in which body he served as Chairman of the Committee of Agriculture. He is now serving his third term as Deputy Secretary of Agriculture, and Director of Farmers' Institutes. In this position he has given his best services to the work, and under his direction, the institutes have become very efficient and Pennsylvania owes to him a great deal for its high position along this line. With him is a body of teachers and instructors that are good, if not the best of their kind that any state has in its employ. It is a long list and to mention them would take a great deal of time, and if I would mention Bob Seeds' name and omit Joel Herr, Joel would be be cross, and if I would mention Prof. Menges' name and omit Mr. Philips, Mr. Philips would be cross, and so it would be all through the list. In their respective places, they have all rendered valuable service. Those of you who are present will become acquainted with these ladies and gentlemen, and after you have listened to their addresses, you then can form a better opinion of their worth and efficiency, than I can give you in this short talk this evening.

The question may come to your minds, Why do we give instructions in agriculture? and this is an important question and one that should be answered. Our forefathers farmed successfully forty or fifty years ago without this vast corps of men traveling up and down our State. They did not have experiment stations or State Colleges or Departments of Agriculture, giving out information. They plowed, sowed, reaped and slept; but today conditions have changed, and these conditions have to be met. Twenty years ago, ten years ago, we did not have what was known as scientific agriculture or book farming, as some of our farmers call it. Our forefathers would say that it was theory, but practice is what made the farmer. But today we have to have theory and practice combined and science and practice combined, and science is nothing more or less than the knowledge of agriculture. We have enemies to combat today that were not known thirty or forty years ago We have all kinds of insect enemies that spring up and injure the vegetation, and follow the crops until they are garnered.

The State of Pennsylvania has a Division in the Department of Agriculture, known as Economic Zoology. You might ask what Economic Zoology is. I would answer you in the language of the distinguished Governor, my friend, Daniel H. Hastings, who signed the law. He said he knew what it was to be economic, but he could not understand this word Zoology. It is one that covers a vast field, and to fully explain it, it would take Prof. Hunt or some other of our scientists all evening to tell you the full meaning of the word. This Division is headed by one of the greatest bug catchers known in the United States, and his warfare is waged all through our commonwealth with great success, and we wish him God speed in his undertaking, and hope that he may live long enough to see the last enemy vanquished from the field.

The question with the farm is, How can I grow better crops? How can I till my soil with less labor? These are the two most important questions that confront him, and he has to call on the scientist to give him instruction. That is one of the advantages of the experiment stations, which have been located throughout the different states by the National Government. We have one located in our own State, which has today a fine corps of scientific workers, headed by Dr. Thos. F. Hunt, and any farmer in this commonwealth that does not call on this experiment station for information when he is in trouble in regard to agriculture, is not making use of the means available and placed at his disposal without cost.

These are some of the questions that will be discussed throughout our meeting, and one of our objects is, that these instructors may give instruction to each other and also to the citizens of your county.

You have been very kind tonight, Judge, to extend the cordial words of welcome. From your talk, I would infer that you would make as good a farmer as you are a Judge, and I think that it is a great mistake that so many of our young men leave the farm and seek to become lawyers, doctors and professional men. We lose the best that our farms produce, and that is the crop of boys and girls. The disposition in the last ten years, among our young men, has been to seek employment in the cities and towns, and we cannot fault them in this, as the recompense has been so large and the labor comparatively easy to the labor on the farm. But I hope the time is not far distant when our boys and girls will see their mistake. The lesson that we are being taught by the stringency of the times at present is one that may be of benefit to us in the future. In the agricultural districts of Pennsylvania the times have been good and failures few, because the stability of agriculture, has been able to carry the people through their losses. But this has not been the case in the cities where our young people received salaries. They spent this each month, and when the times become depressed and they lost their employment, they did not have enough laid by for the rainy day, and had to return to the country to take up their residence with father and mother on the farm. If these young men had, instead of going to the city, engaged in agriculture, they would have been in a position that they would not need to have come back to the old home.

In my travels throughout the State I find a great deal of land that was tilled years ago and is growing up with briers and elders and returning to forest. This is deplorable. Think of the toil and labor that some good man put on that ground to remove the timber and bring it under cultivation. If we would reduce the size of our farms and make it possible for our boys to secure farms the same as our fathers did for us, it might be that we could induce our sons to stay on the farm. In dollars and cents we are one of the greatest states in agriculture, and if I am correctly informed, we stand second or third in the amount of value of our products of any state in the Union. If this is true, we should stand first, if all our tillable land was brought under cultivation. There is no better market for farm products in the United States than there is in Pennsyvania, and we are the largest purchasers of food products of any state in the Union. We have more miners to feed, more mill workers, more mechanics, more well paid laboring men, than any state in the Union, and why should not our agriculture prosper? This is a question for those who are leaders in agricultural lines, to consider. It is something that should be brought to the attention of our Legislature of our State Government, and see if there could not be some ways and means devised to induce people to engage in agriculture. If I do not soon quit talking, you will think I have prepared my speech, but these matters are continually revolving in my mind as I travel around the State. You all know that a man's heart is in the calling he loves. I have not touched on the question of the live stock of the State. This is another great question that should demand the attention of our organizations. Years ago I heard Prof. Hamilton tell of going into Ohio along the Pennsylvania line and buying cattle and driving them to State College for feeders. Years ago your farmers shipped their horses to eastern markets and received good prices for the same. Today they are buying western horses and few colts are seen grazing in your fields as you ride along. Why is this? Too much hustle, too much bustle, too much work and not enough of thought given to what would make your county better.

Hon. Judge, I would ask a little indulgence for this body of men while they are in your midst. If any of them should appear before you for sentence, be lenient with them. They all mean well, but you know how it is yourself, when you get away several hundred miles from home on a trip, you may want to have a good time, and sometimes we get too good. Uncle Sam McCreary has offered to stand bail for any of us that may break any of your laws. I hope none of them will do this, but we will have to throw ourselves on the mercy of the court if we do. We know our stay among you will be pleasant and profitable. I care not where you go in Pennsylvania, you meet some congenial persons whose lives coming in touch with your life, will make you better, and we know that New Castle and Lawrence county will be no exception to this rule.

SECRETARY MARTIN: Mr. Chairman, I notice a number of gentlemen here from whom I have no doubt the audience would like to hear a word at this time; it is only half past eight; I will call on Mr. Alva Agee to say a few words to us.

MR. AGEE: Mr. Chairman and Friends: I thank Director Martin, but I think there should be at least one institute in the State at which I do not talk. Some of you must have the impression that I am always talking. My friend Seeds was up at State College, at a Frat banquet, and he was asked by the boys to make a speech; he said that he had been talking all the time since he arrived at

State College; it reminded him of the husband of one woman who waked up in the night and heard her talking, and he said, "My dear, are you talking again or yet?" and it sometimes seems to me that either again, or continuing, always, I am talking. I thank Director Martin, and my good friend, the Chairman of the meeting, whom I have valued for years, for this opportunity. Tomorrow morning I may take a few minutes of your time, but now I would rather listen to the scientific address by Dr. Hunt.

SECRETARY MARTIN: We have still time for one or two five minute addresses. Will Dr. Detrich just stand up and let us see his face for a few minutes?

DR. DETRICH: Mr. Chairman, Ladies and Gentlemen: I am always glad to be where people are gathered together for the purpose of scientific study of agriculture; there is no more important question before the citizens of our United States today than the scientific study of the upbuilding of the soil. Every man who knows anything knows that this country rests upon agriculture. Every time there is an address made by the President of the United States, or the president of some great railroad, or any great thinking man, he refers back to the soil for the subsistence of the people who live upon this earth. And this is the question we must bring before the people today. We want these men of broad knowledge and scientific study to come before the farmer and tell him how to get the best out of the soil; to teach men the dignity of farming—men of the very best sympathy and knowledge that will make the very best citizens to hand down to generations yet to come; men who will know how to make the most of our lives while we are yet living. I thank you.

SECRETARY MARTIN: We will now have but one more short talk from the Seeds boy.

MR. SEEDS: Mr. Chairman, the Honorable Judge, Ladies and Gentlemen: I want to say that I don't know what to say to you people; most of you have listened to me until you must be only too tired of hearing Seeds talk.

I want to say to you that I thank you for the privilege of traveling across this great State of ours. The country within a radius of a hundred miles from Pittsburg is the greatest farm land in this commonwealth. I have traveled all over this great state of ours, and I think I have brought two hundred boys to State College. It is a privilege to know how to do a thing, and when to do it; that is what they learn up there.

I have just come from Alabama, and I want to say to you that the South is the greatest country in the world for raising persimmons; before the war they used to feed the slaves on persimmons until they forgot that they were hungry. When they are ripe, the are pretty nice, but when the are green, the have a tendency to pucker you all up; and down there it happened that during a communion service they handed out green persimmons, and by the time church was ready to leave out, the congregation was so puckered up that they had to whistle the doxology.

From the register it was seen that the following Institute Managers were present:

County	Name and Address of Chairman.
Adams,	A. I. Weidner, Arendtsville.
Allegheny,	J. S. Burns, Imperial, R. F. D. No. 1.
Beaver,	A. L. McKibben, New Sheffield.
Bedford,	W. Clay Lutz, Bedford.
Berks,	Howard G. McGowan, Geiger's Mills.
Bradford,	Erwin Platt, Wysox, R. F. D.
Bucks,	Watson T. Davis, Ivyland.
Butler,	N. F. Bartley, Euclid.
Cambria,	H. M. Gooderham, Patton, R. F. D. No. 1.
Centre,	John A. Woodward, Howard.
Chester,	Dr. M. E. Conard, Westgrove.
Clarion,	S. X. McCleilan, Knox.
Clinton,	Joel A. Herr, Millhall, R. F. D.
Columbia,	A. P. Young, Millville.
Crawford,	J. F. Seavy, Saegerstown.
Cumberland,	Rev. T. J. Ferguson, Mechanicsburg.
Dauphin,	S. F. Barber, Harrisburg.
Erie,	Archie Billings, Edinboro.
Franklin,	J. P. Young, Marion.
Fulton,	J. L. Patterson, McConnellsburg.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	G. G. Hutchison, Warrior's Mark.
Jefferson,	Peter B. Cowan, Brookville, R. F. D. No. 4.
Juniata,	Matthew Rodgers, Mexico.
Lackawanna,	Horace Seamans, Factoryville.
Lancaster,	E. S. Hoover, Lancaster.
Lawrence,	Saml. McCreary, Volant, R. F. D.
Luzerne,	J. E. Hildebrandt, Dallas, R. F. D.
Lycoming,	A. J. Kahler, Hughesville.
Mercer,	W. C. Black, Mercer.
Mifflin,	M. M. Naginey, Milroy.
Montour,	C. A. Wagner, Ottawa.
Northumberland,	I. A. Eschbach, Milton, R. F. D. No. 1.
Perry,	A. T. Holman, Millerstown.
Schuylkill,	W. H. Stout, Pinegrove.
Snyder,	Chas. Miller, Salem.
Somerset,	John C. Weller, Rockwood.
Sullivan,	E. R. Warburton, Campbellville.
Susquehanna,	F. A. Davies, Montrose.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	Geo. A. Woodside, Sugargrove.
Washington,	D. S. Taylor, Burgettstown, R. F. D. No. 3.
Wayne,	W. E. Perham, Niagara.
Westmoreland,	M. P. Shoemaker, Greensburg.
Wyoming,	D. A. Knuppenburg, Lake Carey.
York,	G. F. Barnes, Rossville.

Of the Institute Lecturers, the following were present:

Allen, Mrs. Mollie MacClaughry, Oswego, N. Y., R. F. D. No. 6.
Barber, S. F., Harrisburg, Pa.
Barclay, Richard D., Haverford, Pa.
Black, W. C., Mercer, Pa.
Bond, M. S., Danville, Pa.
Brodhead, Mrs. C. W., Montrose, Pa.
Brodhead, C. W., Montrose, Pa.
Bruckart, C. W., Lititz, Pa.
Burns, J. S., Imperial, Pa., R. F. D. No. 1.
Campbell, J., Hartstown, Pa.
Carr, Prof. M. Earl, Bureau of Soils, Dept. of Agriculture, Washington, D. C.
Clark, M. N., Claridge, Pa.
Cox, John W., New Wilmington, Pa.
Cure, Z. T., Jermyn, Pa.
Detrich, Dr. J. D., 438 Adams Ave., Scranton, Pa.
Drake, W. M. C., Volant, Pa.
Eschbach, I. A., Milton, Pa., R. F. D. No. 1.
Fassett, F. H., Meshoppen, Pa.
Fritz, Mrs. Sarah B., Duncannon, Pa.
Herr, Joel A., Millhall, Pa., R. F. D.
Hertzog, P. H., Division of Zoology, Harrisburg, Pa.
Hoover, E. S., Lancaster, Pa.
Hull, Geo. E., Transfer, Pa., R. F. D.
Kahler, A. J., Hughesville, Pa.
Kester, R. P., Grampian, Pa.
Lehman, Amos B., Fayetteville, Pa.
Lighty, L. W., East Berlin, Pa.
Mairs, Prof. T. I., State College, Pa.
Menges, Prof. Franklin, York, Pa.
Northup, Henry W., Dalton, Pa., R. F. D. No. 1.
Owens, Prof. Wm. G., Lewisburg, Pa.
Peachey, J. H., Belleville, Pa.
Philips, Hon. T. J., Atglen, Pa.
Phillips, E. L., New Bethlehem, Pa.
Schwarz, Hon. R. F., Analomink, Pa.
Seeds, Robert S., Birmingham, Pa.
Stout, W. H., Pinegrove, Pa.
Thayer, Dr. I. A., New Castle, Pa.
VanNorman, Prof. H. E., State College, Pa.
Wagner, F. J., Harrison City.
Wallace, Mrs. Mary A., Beechwood and Shaw Aves., Pittsburg, Pa.
Watts, Prof. R. L., State College, Pa.
Watts, D. H., Kerrmoor, Pa.
Waychoff, G. B., Jefferson, Pa.
Weld, R. J., Sugergrove, Pa.
Wolff, Wm. H., West Chester, Pa.
Wood, J. C., Shawnee, Pa.
Wittman, W. Theo., Allentown, Pa.

SECRETARY MARTIN: We have with us Dr. Hunt, who will speak to us on a very important subject. You will want to make notes on it; just a minute until we distribute the tablets, and then Dr. Hunt will speak to us.

The citizens of New Castle have offered almost everything to us in the way of enjoyment. Among other things, they have kindly offered to take us by car tomorrow afternoon at half past four to the beautiful Cascade Park, as the guests of the Trolley Company. We will have time to visit the park, and return to the hotel in time for supper.

Dr. Hunt will now address us.

SOME PHASES OF SOIL INVESTIGATION.

BY THOMAS F. HUNT, *Dean of the School of Agriculture and Director of the Experiment Station of the Pennsylvania State College.*

When the speaker was a college student he had a teacher who was not only a teacher, but was also a counsellor and intimate friend. To this teacher the speaker owes more than to any other man except his father. The college student who fails to get into personal relation with at least one of his instructors is to be pitied. He loses much of the value of a college education. I was advised over and over again by this friend and teacher never to make comparative statements, always to make positive ones. The title of my address as printed was, "New Plans of Soil Investigation." The title as submitted was, "Some New Phases of Soil Investigation." The word "new," however, implies a comparison between the past and the present which I do not care to make. The title has, therefore, been amended to read, "Some Phases of Soil Investigation."

A recent book opens with the sentence: "The whole business of agriculture is founded upon the soil. For the soil the farmer pays rent, and upon his skill in making use of its inherent capacities depends the return he gets for his crops." While this is a striking sentence and contains much truth it can hardly be said to contain the whole truth. The soil does not make apples sour or sweet, corn yellow or white. Out of the same soil may grow wheat containing gluten found nowhere else except in rye, or a coffee plant producing in its bean caffein, or the nettle containing formic acid. Upon the production of these substances the soil has no material influence. The cause of these differences, whatever it may be, is to be found in a microscopic cell of the seed and is transmitted with fidelity from generation to generation.

This much being granted, it may be asserted that out of mother earth come all things. A well known writer on nature, not a nature fakir, has used in quite a different connection the phrase, "the divine soil," but it may be used in this connection with the utmost reverence. What a wonderful thing the soil is. Not only are the millions fed out of its bosom, but it is at once the delight and despair of the investigator. It has as many moods as the most fickle goddess. The experimentor carries on a series of elaborate investigations from which he feels justified in reaching certain conclusions. Out of a caution borne of experience, he repeats his experiments another season, only to secure quite different results. The soil was in a different mood. With the first season's results the investigator is delighted. After a second season he is plunged into despair. It is perhaps not out of place to remark that some investigators prefer to announce their first season's results and then proceed to conquer new fields. They can thus remain in a perpetual heaven of delight.

The guests at a dinner party were recently discussing the occurrence of trailing arbutus. Some one asked why it was that none could be found in the immediate vicinity of the village in which they lived, while it could be found in abundance two or three miles away. Some one suggested that all the arbutus near the village had been destroyed in previous years by ardent collectors. This expanation seemed satisfactory to all parties concerned. It may, however, have been due to a desire not to mix science with social small talk. However, this may be, the fact is that trailing arbutus fails to occur in the immediate vicinity of State College for the same reason that chestnut trees, rhododendrons and blueberries do not occur there. None of these plants have ever grown there naturally. They are not lime loving but lime avoiding plants. The soil about State College is of a limestone formation, while the soil on which trailing arbutus, rhododendrons and chestnut trees grow is produced by the breaking down of shales and sandstones. The purpose of relating this anecdote is to emphasize the well known fact that soils do differ in their crop producing power, that while one soil may be well adapted to one crop it may be illy adapted to another. There are tobacco soils, and potato soils, and cabbage soils, and celery soils, and corn soils, and wheat soils, and clover soils, and grass lands. The soil best adapted to red clover is not best adapted to alsike clover. That there is a great difference in the adaptability of soils to alfalfa has been abundantly proven. The following table gives the mechanical analyses of five soils of the humid section of the United States on which alfalfa has been grown.

	Coarse sand.	Fine sand.	Silt.	Clay
1. Dunkirk gravelly loam,	13.4	27.6	42.5	16.3
2. Miami stony loam,	4.1	39.7	32.4	22.5
3. Wabash loam,	2.5	28.4	44.7	24.3
4. Hagerstown clay loam,	3.0	8.4	58.8	29.9
5. Dunkirk clay loam,	2.4	10.7	56.8	29.9

On Dunkirk gravelly loam and Miami stony loam alfafa grows without any difficulty. About the only thing necessary is to sow the seed. On the Wabash loam, good yields of alfalfa can be obtained by proper cultural methods. On Hagerstown clay loam much greater care is necessary and more failures occur, especially owing to variations in season while every precaution possible must be taken to get good yields on the Dunkirk clay loam. Since the mechanical analyses of Hagerstown and Dunkirk clay loam are so nearly identical, the question may be raised as to why these soils differ in their adaptability to alfalfa. The explanation may be sought in two directions: (1) The Hagerstown clay loam has perfect drainage, owing to its limestone formation, while the Dunkirk clay loam, which is a river drift soil deposited by lake action has very poor natural drainage; (2) the alfalfa plant is a lime loving plant and in all humid regions, especially, is, other things equal, adapted to soils of limestone formation.

The adaptation of soils to fruit trees is a question of special interest in Pennsylvania. It has been shown that the soil best adapted to Rhode Island Greenings is not the one best adapted to Baldwins, that the soil best adapted to Baldwins is not the one best adapted to Grimes' Golden. To avoid possible misinterpretation, it should be noted in passing that these apples have a climatic as well as a soil adaptation. It is well known that the soil best adapted to peaches is not in general well adapted to apples. This is a reason why in general peaches should not be used as fillers for apples, or apples grown in order to rest the land from peaches. The speaker had this impressed upon him recently in making a visit to the fruit sections of Adams and Franklin counties. He visited a man who has 140 acres of peaches and about an equal number of acres of apples, although not 280 acres of fruit trees, because his orchards are largely interplanted. The land is De Kalb stony loam and is especially adapted to peaches. Peaches, as the man remarked to me, had been very good to him, but his apples while by no means a failure, were a source of trouble and anxiety. The next day I visited a man located seventeen miles from the orchard just mentioned. The soil type, one of the Porter series, was, however, quite different. The history of the orchard, the appearance of the trees and the opinion of the owner all confirmed the judgment that this was an apple soil and not a peach soil. I was not acquainted with this region. Most of the soil types I had not previously identified. Pointing to an area on the soil map quite unknown to me, I said to my companion: "That is a section where one might expect to find peaches growing." He studied the map a few moments and replied: "That is the location of the large peach orchards of ——— county. The basis I had for assuming that this particular type was De Kalb stony loam, and hence identical with that on which grew the peaches which I had visited on the previous day.

A man who thinks he can buy any kind of a farm and make a success of any kind of farming by the application of scientific methods will find, after it is too late, that a large part of both science and common sense in farming consists in the adaptation of crops and methods to soil, climate and market. It makes one's heart bleed to observe by what long and laborious methods men have discovered or rather have been brought, often without discovery, to raise those crops for which their soil and climate are best fitted. If, as has just been shown, soils do vary in their adaptability to certain crops, and that a knowledge of these adaptations is essential to the highest success, it follows equally that the fertilizer requirement and the best cultural methods vary with the soil and that before any answer can be given to the numerous and constantly recurring questions upon the best methods of growing different crops and the fertilizers required, it is essential to have a definite knowledge of the soil types. For something more than twenty-five years and in four different states the speaker has been more or less actively engaged in experimental work involving the best methods, of cultivating certain standard field crops, including the best methods of fertilization. A number of soil types upon which he has secured direct experimental data could be counted on the fingers and thumbs of both hands. Concerning these soil types he would, when asked as to crop adaptation, fertilizer requirement or cultural method, be willing to venture an opinion, provided he had a history of the previous treatment of the soil. There are, however, in the United States 450 soil types already identified, 440 of which he knows comparatively nothing.

In 1899, Professor Milton Whitney, now Chief of the Bureau of Soils, began a government soil survey in Connecticut, Utah and New Mexico. Up to the present time, soil surveys have been made in every state except Maine and Nevada and in every territory except Alaska and Hawaii. The total area surveyed amounts to 140,000 square miles or 90,000,000 acres, of which 4,000 square miles or over 2,500,000 acres have been surveyed in Pennsylvania, or about 9 per cent. of the total area of the State. These surveys are based on the theory that the physical features of the soil, together with the experience of farmers and the judgment of trained observers who become as expert as tea testers or butter judges, is the best known method of classification with reference to crop adaptation or cultural methods. One very simple device has been brought into use in connection with these soil surveys, which is not only very important but also has for us a useful lesson. How many farmers know anything about the soil of the different fields below the plow slice? Yet if one field is underlain with a stiff, impervious clay while another has a bed of sand it may make the most striking difference in crop adaptation or yields. What the hand lens is to the botanist, what the agar is to the bacteriologist, what the chemical balance is to the chemist, the soil auger is to the soil expert. Each helps to widen our field of knowledge. The man with an auger who has taken the place of the men with the hoe in magazine literature can pass rapidly over the field and bring to view a section of soil to the depth of three feet or even to six feet, if necessary. He is thus able to explain almost instantly many differences in crop adaptation or yield that may have puzzled the farmer for years. It is certainly somewhat remarkable how accurately properly trained men can identify and map the different soil types. I once described to a man who was personally acquainted with a region the characteristics of that region. The soil was described, the relative occurrence of different crops, the difficulties farmers had in raising certain crops in that region, even the character of farm improvement was mentioned. When I was through with my description the man replied that it was exactly as he had observed it. As a matter of fact I had not seen the region I was describing. I had simply looked at a soil map, knowing that certain conditions existed elsewhere on this soil type, I described these observations.

The problem of the soil survey is to correlate and classify soils. The method of classification thus far worked out is first to establish different soil series in the different physiographic divisions of the United States. Each series is given a genus or surname as, for example, Norfolk, Hagerstown, Dunkirk, or Miami. The Norfolk series represents a group of soils of the coastal plain region, stretching along the Atlantic and Gulf States from Boston, Massachusetts to Galveston, Texas. The Hagerstown series includes the residual soils of limestone valleys occurring from Pennsylvania to Tennessee. The Dunkirk series includes drift soils redeposited by lake action occurring in the vicinity of the Great Lakes, while the Miami series represents the upland types of drift soil throughout the great Mississippi Valley. These soils are mentioned simply as striking examples of soil series. These soil series are further divided into types based largely upon their physical properties and are designated by adding a specific or Christian name. In order to understand fully the significance of the classification into soil types, it is desirable to consider briefly the mechanical analysis of soils. The soil particles are given names according to their size (diameter in millimeters), as follows:

	mm.		
1. Fine gravel,	2-1	Coarse sand,	2-.25
2. Coarse sand,	1-.5		
3. Medium sand,	.5-.25		
4. Fine sand,	.25-.1	Fine sand,	.25-.05
5. Very fine sand,	.1-.05		
6. Silt,	.05-.005	Silt,	.05-.005
7. Clay,	.005-0	Clay,	.005-0

These different sizes of soil particles occur in the different soils in an endless variety of combinations and give to the soil in connection with the organic matter, its chief physical properties and to a great extent, at least, its crop adaptation. Based upon mechanical composition, determined as indicated in above table, the following soil types have been recognized running from the coarsest to the finest: coarse sand, medium sand, fine sand, sandy loam, fine sandy loam, loam, silt loam, clay loam, sandy loam, silt clay and clay. Thus we have Norfolk coarse sand, Norfolk coarse sandy loam, Norfolk sand, Norfolk fine sand, Norfolk sandy loam, Norfolk fine sandy loam, Norfolk loam and Norfolk silt loam; or Hagerstown sandy loam, Hagerstown loam, Hagerstown silt loam, Hagerstown clay loam and Hagerstown clay. It will be noticed that a particular soil series does not necessarily include all the specific soil types. Thus the Norfolk series lacks the clay types while the Hagerstown series lacks the sandy types. In addition to the above, we may have, due to the occurrence of stone or gravel, stony or gravelly soils. Thus there are Norfolk gravel and Hagerstown stony loam.

This matter of soil types is of special importance in Pennsylvania because of the great variety of soils in the State. Up to the present time there have been recognized and surveyed in the United

States sixty soil series, thirty-three in the humid section and twenty-seven in the arid section. Of the thirty-three in the humid section of the United States eleven have been found in Pennsylvania. In the United States 450 types have been recognized. Forty-five of these have been found in Pennsylvania, although the state has only been partially surveyed. For twenty-five years fertilizer experiments have been conducted at the Pennsylvania Agricultural Experiment Station on Hagerstown clay loam in Centre county at approximately 1,200 feet above sea level. The Hagerstown series is perhaps the most productive series in the State, and the Hagerstown clay loam probably the most productive type of this series. In this sense the Hagerstown clay loam is probably the most important soil in the State, but the total area covered by this series is comparatively small. If a man writes the station for information concerning the fertilizer requirement of his land, these experiments conducted faithfully during a quarter of a century can be used in answering his inquiry if his land is Hagerstown clay loam, but if it is Volusia silt loam the answer must be different. The first step, therefore, in the systematic study of the soils of Pennsylvania is a soil survey. This has been under way now for eight years and 2,613,760 acres have been surveyed, including, as previously stated, eleven soil series and forty-five soil types. In these surveys the maps have been made on the scale of one inch to the mile. It is believed that after a few more detailed surveys of this sort are made, particularly in the western half of Pennsylvania, it will be possible to make a reconnoisance of the State mapping the soil at the rate of six miles to the inch. It is believed that the work could be completed in two years. After this has been done it will then be possible to make plot tests on different soil types which may be expected to answer certain questions. It may then be possible to interpret intelligently those which have already been made. The Pennsylvania Experiment Station is prepared to conduct, with the co-operation of farmers, such plot tests and thus to study the crop adaptation of soil types. I do not consider that the Pennsylvania Experiment Station is located merely upon a plot of five hundred acres up in Centre county, but that its boundaries are coincident with the boundaries of the State. How this work may best be accomplished is a matter of detail which will require careful consideration.

Having located the soil types and having found that these soils have different crop adaptation or require different cultural methods, the question still remains, why these differences. What is the cause? We say in academic language that to produce ordinary crops there is needed light, heat, water and plant food. There is no doubt whatever, that these things are needed. When, however, we look at plots of ground, one of which yields twice as much as the other and we ask ourselves, what was the variable factor in the production of these crops, we are uncertain as to the answer. Was it the light, the heat, the water, or the plant food, or was it due to some deleterious substance excreted by the plant. The thought that it is desired to develop here may perhaps be illustrated by an example. In the rotation fertilizer experiment at the Pennsylvania Station plot No. 1 in the second tier has received no fertilizer or manure of any sort since the beginning of the experiment in 1882, while plot No. 9 of the same tier has received a complete commercial fertilizer each year; that is, whenever this plot was in corn or wheat but not when it was in oats or grass (timothy and clover). During the whole period the yield of plot 9 was 160, compared with 100 for plot 1, and last season the yield of plot 9 was 197, compared with 100 for plot 1, or a yield of 23.2 and 12 bushels respectively. The only difference in the treatment between these two plots was the application of fertilizer containing nitrogen, phosphoric acid and potash. Was the difference in yield merely a matter of plant food or was there a variation in some of the other necessary factors of plant growth? By installing self-recording thermometers on these plots Brown has shown in data to be published in the next annual report of the Experiment Station that the temperature of the soil at six inches below the surface was the lowest on the high yielding plot in the summer and highest on this plot in the winter, and that at all seasons of the year the extremes in temperature were less on the high yielding plot. It will not do to say that the difference in yield was due to differences in temperature, but it is not unreasonable to believe that the difference in temperature was a factor in producing the results. At any rate it is a good illustration of the complicated character of the problem before us.

There are in this rotation fertilizer experiment, which was begun in 1882, 144 plots which have received twenty-three distinct treatments. These plots after twenty-five years show most marked variations in the yield of corn, wheat, oats and hay, due to the different fertilizers applied. While the crop is growing, it seems that the soil should exhibit some differences, either in heat, moisture, plant food or in some deleterious or toxic material. The problem, then, is to study the soil as it is found under normal conditions, not only as to heat, as has just been illustrated, but as to moisture, plant food and toxic material. If, for example, the application of fertilizer is valuable, not alone because it furnishes plant food but because it destroys substances injurious to the plant, it is possible that we may find some other material or method of destroying such substance, either more effective or more economical. In coming into this State it seemed to the Director of your Station that this rotation fertilizer experiment, which has been carried on for a quarter of a century, offered an opportunity for study of soil problems on a scale and in a manner not heretofore attempted. The previous chemical studies which have yielded some splendid results have been mostly on soils handled in a highly artificial manner and not on soils in which differences in yield have been obtained under ordinary field conditions. The Pennsylvania Experiment Station has, therefore, organized a laboratory for the study of soil problems and the extended study of the various possible factors of plant growth is being made during the growing season and, in some instances, during the whole year on plots which give striking differences in yield.

To summarize briefly, then, the problem of soil investigation as it relates to Pennsylvania appears to the Director of your Station to consist of three steps: (1) a soil survey by which the soil types of the State may be located and correlated; and the general characteristics and crop adaptation carefully described; (2) a study by plot tests in co-operation with farmers or otherwise of the principal soil types, so that the influence of fertilizers or cultural methods may be reasonably predicted; (3) a study of the different factors of plant growth on these different soil types when different treatments exhibit marked differences in yield or quality of product in order, if possible, to determine the fundamental reasons for such differences.

A soil survey of this State is well advanced, having been begun in 1890 by the Bureau of Soils of the United States Department of Agriculture. In two or three years it is hoped that a reconnoissance map of the whole State may be completed. The Pennsylvania Experiment Station is carrying on co-operative fertilizer tests in different parts of the State to determine the fertilizer requirements of the soil. When the soil types have been determined, it will be desirable to prosecute this work in a more systematic manner. A study of the fundamental questions relating to plant growth was begun in March, 1908, at the Experiment Station upon Hagerstown clay loam. If this leads to important results it will be extended to other soil types. In the meantime, if the farmer will raise an abundance of leguminous crops, establish a proper cropping system, keep one mature neat animal or its equivalent to each four acres of land, he need not be alarmed over the question of soil fertility on most of the soils of Pennsylvania.

MR. RODGERS: If a farmer from any county in Pennsylvania should send a sample of his soil to State College, will they send a report of what kind it is, and what the analysis is, and what vegetables or plants should be planted in that soil?

DR. HUNT: If you send a sample of soil, say the amount that will go in a cigar box, and also a sample of sub-soil, we can tell you the type, for example, whether it is Dunkirk gravelly soil or Hagerstown clay loam. We can inform you what experience has shown to be the best crops for this soil.

MR. SEEDS: How do you explain a community that has been a great peach community, and which today is not making a success of growing peaches. Take the Juniata Valley, for instance, Mr. Rodgers' own county. At one time that was a prominent peach country; today it produces scarcely any peaches.

DR. HUNT: I don't know the local conditions, but I do know that in Franklin county, excellent peaches are grown on certain soils —and the soil map indicates that the same kind of soil exists in the region mentioned. It may be simply that in some other region where there is a better climate peaches can be grown more profitable.

MR. SCHWARZ: Is it not a question more of diseases in trees than of climate?

DR. HUNT: It may be.

MR. HUTCHISON: I have seen two kinds of soil that seem to come under the Hagerstown series. Are they the same thing?

DR. HUNT: There are two soil types in the Hagerstown series commonly occurring in your valley, viz.: Hagerstown clay loam and Hagerstown silt loam.

MR. CLARK: I was on a little farm the other day, where there were quite a number of peach trees. I thought they were seedling peaches; many of them had considerable fruit on them, but right in the midst of the trees I noticed a dozen or two dozen trees on which there were no peaches; I said to the young man, "There are no peaches on these trees; why is it?" He said, "They are budded trees, and have not begun to bear yet." Now, why was that?

DR. HUNT: I refer that to Prof. Watts, who is an expert on the question of fruit.

PROF. WATTS: I wish Mr. Clark had asked a question that I could answer. There are a great many questions that we cannot answer. For instance, why is it that the Baldwin apple will only give us a crop every two years instead of every year? In regard to the peach trees, it may be that it is due to conditions. It is probably lacking in pollen. If we knew more about the tree from which the bud was taken, we could probably tell more about it.

Now, in regard to peaches failing in Juniata county, we might say the same about peach sections in New Jersey. The peaches they have are taken out of the old orchards; new orchards are being planted, but I presume in eight or ten years it will be the same thing over again. Now, I believe that if the men of Juniata county will plant new orchards, and take care of them, they can grow peaches just as well as they did ten years ago.

SECRETARY MARTIN: Now, gentlemen, it is not every day in the year that we have Dr. Hunt with us to question regarding the soil. I am sorry to say he cannot remain with us during the entire session, so we had better make use of him while we have him with us.

MR. WOLFF: Can the Doctor tell us what are the best books published on soils, so that we can read up on the question?

DR. HUNT: I believe that the best book for you is entitled "The Soil," by Hall, an English publication, but if you want to get into touch with this question of soil types, the best thing for you to do is to send to the Bureau of Soils at Washington for their publications. It will cost you nothing. These reports will be sent to you on application. By reading them you would get into touch with this question of soil types, of which I have been trying, in my way, to tell you tonight.

MR. HERR: May not Mr. Clark's question be answered in something like this manner? These peaches which have been grown in a certain soil for years, have been transplanted into a new soil, and probably they will not stand the same amount of frost, and in the spring are injured by the frost?

DR. HUNT: That is a rational and possible explanation, but no one can say it is a fact unless it has been investigated.

MR. STOUT: Is not a book on soils published by Hilgard?

DR. HUNT: Hilgard's book on Soils is a standard publication. It costs four dollars. There is no better of its kind.

MR. RODGERS: The question of Mr. Clark has not been answered. We have heard tonight that the same soil will not grow Baldwins and Rhode Island Greenings. May not these buds have been of a type not adapted to the soil?

DR. HUNT: I am very glad you brought this up. It gives us another possible explanation, but we cannot tell without actual investigation. Many of you know Mr. Gabriel Hiester, of Harrisburg. A man was sent to Mr. Hiester's orchard, to look at the soil, and he said to him, "you cannot grow Baldwin's here," meaning Baldwins of high quality. "Why," asked Mr. Hiester. The man said "because the land is not right." He asked him, "what can I raise here?" The man said, "Rhode Island Greenings, and," he said, "here is Baldwin land." I met Mr. Hiester in the fall and he said, "I wish you could have seen my orchard when the fruit ripened. It came out just exactly as Mr. Wilder said it would."

MR. SEEDS: The soil in Adams county is that the same as the soil running down through Georgia?

DR. HUNT: No, sir; it is an entirely different soil series; peach soil of Alabama belongs to the Orangeberg series. Peaches are raised in Pennsylvania on the DeKalb series.

SECRETARY MARTIN: Here in New Castle we have the silt. To what does it belong?

DR. HUNT: The Volusia series; I am not sure whether it is Volusia silt loam or Volusia loam. I hope it is Volusia loam because it is the better soil.

MR. McCREARY: Cannot the soil be changed? Can't it be made richer?

DR. HUNT: Undoubtedly either soil can be improved by manuring it, but it is much more difficult to maintain the fertility on Volusia silt loam.

SECRETARY MARTIN: My question was rather in regard to the growing of the peach and apple in this soil; whether it would be favorable to the growth of this fruit.

DR. HUNT: I don't believe I quite understand the question.

SECRETARY MARTIN: Is it a favorable soil for the growth of the apple and the peach?

DR. HUNT: The Volusia loam is a fairly good apple soil for certain kinds of apples, like the King and Baldwin. These types of apples have been raised at least in New York State, in Volusia loam successfully. The climatic conditions are, however, somewhat more favorable in New York State for Baldwin apples.

MR. SEEDS: Do you think the climate, and not the soil, the first requisite in raising peaches?

DR. HUNT: Both are requisites; if you have been in the peach region of the South, you know it is only on certain types of soil that they raise peaches.

MR. SEEDS: What I am getting at is this: where the soil is all terraced until you can't find a straight worm line, you find the finest and greatest peach country. In Centre county I learned the difference between a man earning eighteen dollars a month, and a man earning thirty-five; and I have learned something tonight. I have come from Georgia where they raise peaches, and I have learned that they might have just as poor land in Tennessee, and they won't raise peaches on it. Here we find certain land specially adapted to raising peaches on it, and there other land specially adapted to raising apples.

PROF. WATTS: I would like to ask Mr. Seeds and Mr. Rodgers whether they know of any peach orchard in Juniata county which, since it was put out five or six years ago, has been given the proper care up to this time?

MR. SEEDS: I know they raise peaches further north, and I know there are several men who raise peaches there, but they tell me that the trees do not live long enough to reach maturity. I don't know, I don't live there.

MR. RODGERS: I would answer the question of Prof. Watts by saying that there is one man down in McAllistersville, raising peaches very finely. I have been in his orchard, and have seen some very fine peaches there. His name is Jamison. He is a brother to John Jamison, who belongs to the Fruit Growers' Association.

A Member: Why is it that we can't raise clover, especially clover seed? Now, I would rather pay double for clover seed raised near home than what I have been getting for the past twenty-five years. Why is it that we can't raise it?

DR. HUNT: I will say, in the first place, I don't know, and then I will go on, and give you possibly some suggestions. There are certain places where you can get clover by liming, where you cannot otherwise get it. It is said the land is acid, and lime sweetens the soil. By putting on from a thousand to three thousand pounds of lime per acre, clover will grow well when it will not otherwise do so. We have in certain parts of the United States a disease known as anthracnose that prevents the growth of clover. They have it in Europe, and they have to let the land lie fallow for seven or eight years, until the disease germs die out.

SECRETARY CRITCHFIELD: In some sections of the State we used to grow clover from seed; now, we grow clover and get no seed; isn't this what the gentleman referred to?

A Member: Yes, sir.

SECRETARY CRITCHFIELD: During the earlier years of my farm, we could grow clover very successfully from our own seed, but now we can't get any more seed, for some reason.

MR. HUTCHISON: There has been almost a clover famine in our country, and now we are seeing the folly of it. I have been in the farming business for forty-eight years, and I have never seen seed clover grown in our section.

The CHAIRMAN: The time has come to adjourn, gentlemen. We will adjourn until tomorrow morning at nine o'clock.

SECRETARY MARTIN: Mr. Gooderham will be in the Chair tomorrow morning, and the program will be a most interesting and instructive one. Dr. Klein will tell us about "Veterinary Sanitary Work"; Prof. Carr will continue along the same lines as Dr. Hunt, and address us on "Soil Resources and Their Utilization," and Dr. Detrich will talk to us on "The Acre and the Market." I trust you will all be here to listen to these gentlemen.

New Castle, Pa., Wednesday Morning,

May 27, 1908, 9 A. M.

Mr. H. M. Gooderham in the Chair.

SECRETARY MARTIN: Just a few announcements before we begin. Immediately after twelve o'clock there will be a photographer here in front of the Court House to take a photograph of the company. I want to say a word about this. You know we will have a bulletin of the proceedings printed, and we want the picture for this publication.

Also I want to correct the announcement made yesterday in regard to our trip to the park; that trip has been postponed until Thursday afternoon, the Automobile Club of the city has arranged to take you all on a little excursion into the surrounding country. Let me say that it matters little whether you go North, East, South, or West, you will find surrounding New Castle, a fine country, and in order that you may get a good view of it, we will take a little trip in the automobiles. Now, in case there are not cars enough to take us all on this excursion at once, they will return and take the other half on the same excursion. We want every one of you to go.

A Member: The Postmaster told me that there is mail there for quite a number of the members, and he would like them to call and get it.

SECRETARY MARTIN: The brethren will please take note of this; besides we want you to visit our fine new postoffice building

I am in receipt of a letter from H. H. Hall, of Potter, regretting that sickness in the family prevents his attendance. He sends his kind regards to all brother and sister members.

The session this morning will be in charge of Mr. H. M. Gooderham. Brother Gooderham represents the young man in agriculture, and in Institute work. He is the youngest member of the State Board, and stands way above high water mark in every way in agriculture, hence I am pleased to introduce Brother Gooderham as Chairman of this session.

MR. GOODERHAM: I hope to be able to fill the position, and thank the Board for the high honor it has conferred upon me. I am two thousand feet above the sea level, and six feet on top of that, yet, and still have hardly reached high water mark.

SECRETARY CRITCHFIELD; I have a letter here from our Brother Fenstermaker, in which he says he regrets being unable to be present, extra pressure of work making it impossible for him to be here; he kindly expresses his regards to the members of the Board.

The CHAIRMAN: Is Dr. Klein in the room?

Dr. Klein did not appear to be present at the time.

The CHAIRMAN: Is Prof. Carr in the room? If so, we will proceed with the next subject on the program.

Prof. Carr then took the floor and read the following address:

SOIL RESOURCES AND THEIR UTILIZATION.

BY M. EARL CARR, B. S., *of the U. S. Department of Agriculture, Bureau of Soils, Washington, D. C.*

The soils of the United States are by far the greatest natural resources of the country, and as such should not only be intelligently utilized but carefully conserved that their productivity for future generations may not be impaired. This natural source of wealth is without exception the greatest economic endowment of the American people, furnishing not only food for man and beast but a vast amount of the raw materials used in our manufacturing industries. The value of the wealth derived from our mines amounts to a fabulous sum annually, but from their products neither man nor beast is fed or clothed. The value of other non-agricultural products is also great, but even in the aggregate the wealth derived from these sources is insignificant when compared with that wrested by the toiling farmer from the soil with the aid of the rains and the sunshine.

The resources of the soil are not fixed quantities as are those of the mines, the quarries, etc., but are ever ready to respond with the creation of wealth upon being called to do so by the farmer through intelligent utilization. They are not decreasing sources of income as are the mines and quarries, which, when once worked and the ore and rock are never restored, but under business-like and scientific management they are capable of furnishing not only annual but annually increasing profits.

The American people have not realized the vastness and importance of these wonderful resources. They have as yet scarcely begun to utilize them as they may and will be utilized in future years. Land has been cheap and the cultivation of new acres has been uppermost in the minds of the husbandman, rather than the full utilization of the old ones. In a few places, near some of our great cities, intensive cultivation and cropping has been given the soils with resulting immense yields and large profits, but by far the greater portion of our agricultural domain has never been called on for anything like the intensive systems of agriculture common in the densely populated countries of the Old World and extensive systems of farming have always been employed in the utilization of these vast dormant resources. The soils of this country have not been required in the past to show to their full extent the capabilities which they possess and their ability to produce wealth for mankind. In many if not in most cases, it is safe to say, that these valuable resources given us by nature have not only been asked or required to do their best, but have been neglected, misused, and robbed rather than carefully utilized by the past and present generations or conserved for the generations that are to follow. Secretary Wilson said in a recent address: "The people of the United States have wasted their inheritance of land and woods, of fish in the waters, and minerals in the earth. The soil has been robbed in the East and South and West." It has not been necessary in the past for the soils to produce more than they have been producing, neither has it been necessary to exhaust and rob this natural source of wealth just because it can not strike back. The markets have been fully supplied and sometimes even oversupplied and prices have consequently sometimes fallen below the cost of production. But at present, in spite of our enormous production of wealth from the soil, some of the food products are extremely high in price.

The needs of the rapidly increasing population of the state and nation have, in the past, been largely met and supplied by the cultivation of an increased acreage in our farm lands. In fact, as I shall point out, for the past thirty to forty years the growth of our country in population has been paralleled by the growth of the farm area of the country. This has been possible through the opening of the cheap government lands of the West to settlement and their utilization for the production of farm crops to feed not only our own people but the starving of nations across the seas.

The cattle ranches have given way to cotton patches in the great Southwest. The free and open ranges of the West have been driven back by the advance of the farmer pioneer and his plow and in their place have come the corn fields and the wheat fields. Where the Buffalo, proud possessor of the prairie, herded unmolested not so many years ago we now have American farm homes, the pride and stability of the nation. The desert lands of the far west have bloomed with food products for both man and beast under the magic influence of water supplied by irrigation. The semi-arid section of our country has also been made to contribute its mite in producing food supplied for onr people by the introduction of new crops and new systems of soil management adapted to the soils and climatic conditions there existing. The Great American Desert, known to the past generation, has been crowded from the map by the advance of scientific agriculture. Besides feeding our own people bounteously, "as no other people ever before were fed," the soil contributed during the fiscal year ending June 30, 1907, a surplus of products for export valued at the stupendous sum of $1,055,000,000 or a balance of trade in farm products alone in our favor of nearly a half billion dollars, the imports for the year being valued at $627,000,000. During the past eighteen years, the soil has never failed to produce a surplus large enough to provide for a balance of trade in our favor and the aggregate amount of these balances amounts to $6,500,000,000, while during the same period of time our international trade in other commodities has resulted in an adverse balance amounting to $456,000,000. Thus since 1890, we can not only thank the soil for preventing us from becoming a debtor nation, but also thank it for making us a creditor in the commerce between the nations of the world to the amount of over $6,000,000,000.

Regardless of our great manufacturing interests—and they are great indeed—and the large export trade which they maintain, were it not for the surplus products derived from our soil resources, the favorable balance of trade, in which we so justly pride ourselves, would be entirely wiped out and we would become a debtor in our international commerce. Can we in justice to ourselves and our posterity afford to let this happen? The question confronting us today is: shall we endeavor to maintain our position as a creditor nation in the markets of the world or shall we content ourselves with producing from the resources of our soils only enough to feed and clothe our own people, leaving the balance of trade to the manufacturing interests? The experiences of the past go to show that this would not be a safe thing to do, and I believe that this question can and will be answered by the farmer and the soil. No great crisis has developed in the past, but the American farmer has borne his share and even more than his share and no great need has been required of the soil but it has responded bounteously to intelligent tillage and more than satisfied that need. The question has been answered in the past by the soil, at least in part, from the point of view of an increased number of acres. Let me give here a few figures which will explain this statement. In 1880, the total farm area of the United States was 536,081,835 acres, divided into 4,008,907 farms. In 1900 this acreage had increased 56 per cent. or to 838,591,774 acres, cut up into 5,737,372 farms. While the farm area had increased 56 per cent., the number of farms had been increased over 40 per cent., thus showing that the average size of the farms had slightly increased. This increase in size amounts to only

13 acres but is reflected in the fact that there had been a decrease in the ratio of improved farm land to the total of 3.7 per cent., or from 53.1 per cent. to 49.4 per cent.

Coincident with the increase in growth of our farm area and number of farms has been our rapid increase in population. During the two decades that our farm land increased 56 per cent. our population increased in practically the same ratio. Our gain in population was 26,147,604, or 52 per cent. greater in 1900 than in 1880.

During the period, which has elapsed since the last Federal Census there has been a gratifying increase in the value of farm products. It is to be regretted that there is no data available concerning the acreage and improvement of farm lands later than those quoted. However, in considering this increased value of products of the soil we must bear in mind not only the increased production but also the high market prices as well as any increase in acreage. We must also take into account the fact that our population has increased from 76,303,387 in 1900 to 84,154,009 in 1906 or a little more than ten per cent.

The meeting of this question by the soil must in the future be different from the past. Although only about one-half of our total land area is now held and classed as farm land, we cannot look for any considerable extension of the farm land area, for the greater part of that portion of the country not now held and occupied by farms is either mountainous, hopelessly arid, or otherwise unsuited for agricultural purposes. While we cannot materially add to the area already classed as farm land, our population is increasing and will continue to increase and their needs must be met and supplied. The population of our country has doubled in the last thirty years, and is now increasing at a rate more rapid than ever before. At the present rate of increase it will be only about twenty-five to thirty years before we will have 150,000,000 people to clothe and feed, and when that time comes our production must also be doubled. All increases in our population must be met with corresponding increase in our production of food crops, and with small possibilities of so enlarging our farm area as to meet the demands, there is but one solution possible, that is, every available acre of farm land must be made to produce larger yields than they have ever done before.

Today, in our great centers of population, there is an actual scarcity of some of the farm products. New York City and other large cities cannot secure enough of some of the easily perishable products of the soil even at extremely high prices. This condition of the markets is coincident with a greatly increased cost of living and almost prohibitive, to some actually prohibitive prices of some of the actual necessities of life. Those who live in the country and small country towns and have all these merely for a little time and labor in growing them or at a nominal price if they buy them can little realize the situation prevailing in the city, especially among the poorer classes. But little relief from these conditions can be realized unless through improved methods, intensive cultivation, and intelligent utilization the soils of the country are made to respond to the demand made upon them with increased and increasing production as the years go on. We cannot hope to improve these conditions unless our people realize them in securing larger yields and at the same time how to husband them for the succeeding years. This demand for the products of the soil has not been fully realized by the farmer and certainly has not been met in the past few years of unprecedented commercial activity. However, I believe that the farmer and the soil are capable of meeting and satisfying the present and even much greater demands which will be made upon them in the future.

Of the total area of the country less than one-fourth is actually improved and utilized in growing crops to feed the people. The remaining half of that portion included in farms is swamps, woodlots, hillside pastures, and land otherwise unimproved. We can expect some help from this class of lands. Drainage of the swamps and the protection of overflow lands will add considerable to the total area. It is estimated that some seventy-five to one hundred million acres can be added to our cultivated area by this means, thus providing for several million more American farm homes. Some of the woodlots will be cleared and brought under cultivation, some of the hillside pastures may be used for producing fruits, and some of the grazing land will likely be subjected to the plow, but no permanent relief can be expected from these extraneous sources. The real relief and actual solution of this problem will and must be in the intelligent and rational utilization of the resources of those acres already dominated by man and now used for farm purposes. The question then confronts us, is this possible? We have already heard a great deal about "worn-out soils" and we have heard about "abandoned farms," and from the standpoint of some any great increase in production from our present cultivated area cannot be expected. However, we need not be alarmed at the rantings of these pessimists, for many of their sayings are untrue and experience has proven that the soils are not "worn out," and that even though some farms are abandoned they are still capable of producing remunerative crops if properly managed. In fact our experience tells us that larger yields can be and are secured by more intensive, more scientific, more intelligent systems of farming and soil management.

The breeding and selection of seed has increased the yields of some of our staple crops by a large percentage. The improvement of strains in our dairy herds has increased our production of milk, butter, and cheese, but in the fact of this the prices of all dairy products has advanced steadily until within the last few months when they have become prohibitive to the poor laboring classes in our cities; the same is true of meats and many of the vegetables, and they have practically disappeared from the tables of those who need such articles of food most or have been replaced by articles of an inferior quality and wholesomeness. Nevertheless, the breeding and selection of seed from the most vigorous and prolific plants and the improvements of our strains of both dairy and beef cattle has and will help to solve the problem of providing for an increasing population and a more fastidious people. This work must be more vigorously prosecuted in the future than it has been in the past. It must also be extended along all lines of agriculture and animal husbandry that the maximum results from it may be obtained. Intensity of cultivation and care has increased the production of many farms many fold, even on some of the so-called "worn out' lands. Likewise some of the farms which have been abandoned because of so-called "soil exhaustion" are now producing phenomenal crops. Only last season I saw corn growing to a height of twelve feet on what a few years before was called "worn-out" land, and actually abandoned for several seasons because truck crops would not grow on it. The rotation of crops has, where practiced, proved to be of inestimable value in maintaining and increasing the yields received from the soil. Thus, this practice more generally followed will help to answer this important question. The introduction of new crops suited to our many different soils and our varying climate and the growing of crops adapted to the different soils and climatic conditions are points of fundamental importance in increasing our national production and maintaining our commercial position among the powers of the world.

With the practical application of the adaptation of not only crops to soils but of the different varieties of the same crop to soils comes the necessity of a close study of the characteristics of each and every different soil, not alone by the scientist, but by the tiller of the soil, the farmer himself. Not only the soil but the different methods of cultivation and soil management must be studied in order that we may follow that method which produces maximum results at a minimum expenditure. When these adaptations of crops to soils, these methods of handling the different soils, etc., are definitely worked out and practically applied in our systems of agriculture, we may reasonably expect an increase in production far greater in value than the cost of the effort expended in their study and investigation.

In the utilization of our soil resources there are certain things which we must keep in mind.

In the first place a warranty deed gives us possession of and the right to use land from the surface downward to the center of the earth and the air from the surface upward as high in miles as we can imagine. Yet in spite of these legal rights we find, more often than "once in a while," farmers who plow and till as though they owned only the surface few inches of soil and none of the air above the soil, and certainly the harvest on many farms shows that the husbandman has either forgotten his rights to enough soil for a proper seed bed or has been negligent in some other essential. Last fall I saw a farmer plowing and evidently he was of the opinion that his deed only called for the surface three inches of soil, for that was the depth which he was turning the sod. I will wager that if you should call on this man this fall and see his crops, which are as certain to be poor as the sun is to set tonight and rise again tomorrow morning, his excuse for their failure would be either or both "worn out soil," "bad season." Neither of these can call us untruthful or something less pleasing so it becomes easy to lay all blame there when perhaps it would fit our own shoulders proverbially "like the paper on the wall." If we expect to receive adequate returns from the soil we must begin at the foundation and prepare a seed bed of sufficient depth and of such condition of tilth as to furnish an ideal home for the growing plants which constitute the crop.

There is another important reason why we should not lose sight of the fact that our deeds give us a title to the soil vertically as well as horizontally, the latter measured in acres, the former by no unit or standard. The plant food elements of any soil are not confined to the surface soil alone, though some would lead us to believe that they were. We hear and read that there is just so many pounds of potash, just so many pounds of phosphoric acid, and just so many pounds available of each of the plant food elements in an acre of this and that particular soil and that this and that crop use just so many pounds of each in its growth and maturity and removes this amount and that amount when harvested and marketed. It is then figured from this data that in so many years all of this available plant food will have been removed and the soil will be "worn out," "exhausted of plant food," as it were. While I am willing to admit that there is truth in this theory and that it is easy to explain poor yields in this way, I am not willing to admit that it is the whole truth in the economy of crop production.

There are three important things that those who adhere to this theory either forget, disregard, or overlook. First: They disregard the fundamental theory of a chemical solution. A chemical solution under normal conditions may exist in two conditions, an unsaturated condition, or when it will take into solution more of the solid, and a saturated condition, when no more of the solid will be taken into solution even though it be present. Now, the soil moisture from which the plant receives these elements of plant food necessary for its growth is a chemical solution and under normal conditions is saturated, all rock forming minerals being more or less soluble. Again, the development and growth of the plant removes some portion of the plant foods held in this saturated solution, the soil moisture, leaving it in the unsaturated condition but being in contact with the soil grains, which are made up of minerals containing the plant food elements, and the soil forming forces still acting as they have continued to act through the ages, never having ceased, never resting, always busy, the soil solution soon establishes its chemical equilibrium and maintains itself in the saturated condition. Second: It is too well known to comment that the excreta of waste products of metabolism from animals is poisonous to the same animals. It is not quite so universally known among the people that the excreta material from bacterial life is destructive and poisonous to bacterial life of the same kind and when it comes to the effects of the excreta of plants upon plant growth and crop production we know little about it and those who hold to the theory mentioned lose sight of it entirely or scoff at the very idea. The theory of toxines formed by the excreta of plant life is not new, but for a long time was lost sight of in the glare of Liebig's plant food theories. Nevertheless, in spite of adverse criticism and scoffing it has been definitely proven that plants do excrete substances which are toxic to the same plants, but which may be either beneficial or neutral to another kind of plant. Further, some of these toxines have been actually separated from unproductive soils, their properties determined and their chemical nature and composition defined. Third: Again those who hold to the theory of exhausting the soil of plant food base their calculations on the amount of the plant food elements present in the surface soil alone, not reckoning with the movements of the soil waters and their carrying of these materials upward and downward in their action in and through the soil and subsoil. The rains falling on the surface soil cause a downward movement of the soil waters but later as evaporation takes place at the surface that water which was forced downward perhaps to a considerable depth is brought upward again by capillary action, that is, it is passed from one soil grain to the next and so on. This water, when at a depth, must have dissolved some plant food, and when brought back within the root zone of the various plants it is not unreasonable to think that some of it is brought up with the rise of the water, and it is altogether likely that the plants use some of it in their growth. When this happens it must necessarily make a hole "below the water line" in the theory that "there is just so much plant food and it will last just so many years."

In the practical utilization of our soil resources we must not forget their conservatism for our children, our grandchildren, and their children and grandchildren. In this connection we must recognize that we have a clear title to the air over and above our farms as far up as we can see and that this air is four-fifths nitrogen, that element of plant food for which you pay twenty-five to thirty-five cents a pound when you buy it in a gunny sack. We must bear in mind that this nitrogen in the air is ours and a portion of it at least is for our soils, not for so many cents per pound or dollars a ton, but for the care and skill exercised in providing liberally for legumes in our systems cropping.

I have already alluded to the question of increasing our farm area by the drainage of swamps and protection of overflow land, but in this discussion I want to speak of drainage from another point of view. I want to speak of lands already classed as farm lands and even in many cases included in improved farm lands. In the first place, there are, on almost every farm, ponds and swampy places varying from a few square rods to several acres in extent. Although, usually no one farm contains much of this waste land, the aggregate area must be very large. The removal of the excess of water from these wet places by drainage would make possible the utilization of an additional large acreage of extremely productive soils and at least several millions of dollars added to the credit of the soil resources annually, where now the product is pestilential in its nature and the existence of these spots an eyesore on the agricultural landscape. In the second place, many fields, many soils are giving poor yields and we hear the old familiar cry of "bad wet season." Much of our agricultural domain, many of our soils, would be beneficial by underdrainage aside from the problem of swamp drainage to remove the surface water just mentioned. I need not dwell on these points or speak of the practical benefit to be gained more than to say that the farmers would be many times repaid in dollars and cents by the drainage of swampy areas to remove excesses and accumulations of surface water and underdrainage to remove excesses of water within the soil itself, the former being inimical to plants having an agricultural value and the latter alarmingly injurious to them.

Then, too, there is on almost every farm some waste land along an old fence where a hedge row of brush has grown, some more around old stone piles and in various places. We have to pay taxes on all this land whether we use it for profitable crops or for the growth of useless brush which afford only a harbor for vermin and insect pests. The cleaning out and utilization of all these places would not only result in an increase in our crop yields, but in destroying the breeding places and shelter of some of the most troublesome and destructive of our pests. This, too, would also pay in the very looks of things to say nothing of financial returns.

There is just one more point on which I wish to touch. At first thought it may seem to you that it has but little bearing on the subject of soil resources, but I believe, and I think you will agree with me after a moments consideration, that it is extremely important and of vital interest to the welfare of the state and nation and has a direct bearing on the utilization of the soil resources. This is the subject of the education of our boys and girls. In the past, practically all of the education of our young people, even in our country schools, has been away from the soil, away from the farm, instead of toward it, and not all of this kind of teaching has been done in the schoolroom. Much of it has been done on the farm in our own homes by making a drudge of the boy or girl and thoughtlessly not allowing him to take any interest in the farm work except to do more of it. Some of it has been done at our own firesides when we have complained about our calling, when we have been the "bear on the market." This has been done when no other calling, no other business on earth could stand the business methods employed by most farmers and thrive. Yet we envy the merchant, the mechanic, and the manufacturer when all the time our own business is the safest, the pleasantest and the most independent business in the world. And then after complaining about our business we sometimes wonder why the boys leave the farm and go to the city. I do not wonder at it at all. I was a farm boy myself not so very long ago and I have seen and heard all these things and know their influence. One family I knew in my boyhood consisted of six boys and one girl. Every one of these boys left home and the farm the very day they were of age and only one of them is now farming, and no one could blame them for leaving. They never knew any of the beauties of farm life, the only side of it they were ever taught was the work side. Again, when I go back to my old home there is one of the most prosperous of the small farmers of the whole county who tells me that farming does not pay, etc., even in these days of high prices for everything he has to sell and he lives in the finest house in the neighborhood and has an immense red basement barn bursting with the products of the soil, besides all this he has a nice bank account and ready money in his pockets. All this on one small farm and yet "farming does not pay."

In your sister state to the north about thirty per cent. of the people are employed in the trades and manufacturies, about twelve per cent. in agricultural pursuits and about five per cent. in the professions, and practically all of the education is toward the five per cent. and none of it directed specifically toward the twelve and thirty per cent. You may say that this is being remedied by the Agricultural Colleges, but it is not. I would not for a moment detract from their work and usefulness, but it is a physical impossibility for them to do more than touch the surface of the problem. There are in New York 226,720 farms and in your own state practically the same number. Now, with the present work of the agricultural colleges it would take them nearly one hundred years to furnish one graduate for every hundred farms if all of the graduates went back to the farm, and unfortunately not more than half of them go back to the soil, the remainder we must have as teachers, experimenters, etc. Thus you see that it is absolutely impossible for our agricultural colleges to cope with the problem at all.

We need to begin at the bottom and teach agriculture in our public schools, we need to go one step further in our education of the boys and girls and give them the same high school facilities to learn of agriculture as we do to learn of the rudiments of law, theology, and medicine. In other words we need and must have the agricultural high school or secondary schools of agriculture to primarily fit our young people for the pleasure and triumphs of farm life. We need to instil in the minds of the boys and girls in our own homes a love for the soil and pleasant things of farm life instead of placing before their receptive minds the glitter and glamour of city life and the pessimistic side of farming. Not until this is done can we expect to realize in full the utilitarian side of our soil resources. Right here let me say that in doing this we do not need to fetter that bright boy, who perhaps does not like farm work, but has the ability and aspirations to do something else. We need some of these farm boys for future clergymen, teachers, bankers, lawyers, legislators, governors, and presidents of these United States.

In the betterment of agriculture and utilization of the soil resources we must take into consideration all these things. We must study closely every soil and then utilize each for the production of crops to which it is adapted. This study is fundamental. We must reforest those soils which never should have been cleared and we must utilize the present forest products of the soil in the best possible way that they may not be wasted as they have been in the past, that the remaining growth may not be destroyed or injured. In order to make the most of our opportunities to feed our own people as well as to maintain our export trade, we must make those acres now idle contribute their share to swell the grand total of wealth which our soil resources give to us annually. We must have a complete understanding of conditions both good and bad. I do not mean seeing adverse conditions for pessimistic reasons but seeing them that we may understand better how to overcome them and remove them from their position of influence.

In conclusion, let me state that we are engaged in the best business on earth and that nature always has done her part and always will in the utilization of the greatest gift an allwise Creator could possibly have placed in our hands. Now, let us not only utilize this great gift sanely for our own purposes but conserve it for the use of the generations of future ages. This is not only our privilege but our duty and if we leave it undone what can be our reward?

The CHAIRMAN: The questions in this paper will be taken up this afternoon for discussion. We have a lot of ground to cover this morning, and will proceed with the next subject, an address by Dr. Klein on "Veterinary Sanitary Work."

VETERINARY SANITARY WORK.

BY DR. LOUIS A. KLEIN, *Dept. State Veterinarian, Harrisburg, Pa.*

I appreciate the honor of being invited to address this meeting, and only regret that a stress of work has prevented me from writing a paper on the subject which I am to discuss. It is a very large subject, and one that should be given careful consideration. Anything that is said in reference to it should be considered well before it is said, otherwise facts may be stated in such form as to be misunderstood. For this reason I would have preferred to have had an opportunity to write out what I have to say.

Veterinary sanitary work, as you will know, is concerned with the prevention and control of animal diseases, and is indirectly connected with the public health, inasmuch as disease may be transmitted to man by the consumption of animal products. When we speak of sanitary work, we are usually inclined to think of merely the contagious and infectious diseases. This is probably because most of the work of this character with which we are familiar is performed under the authority of laws that were passed for the purpose of controlling such diseases, but there are many veterinary sanitary measures that can be applied to the control and prevention of diseases which are not of the type usually classed as infectious—not only in animals but also in man. The ill effects that result from the use of unclean milk by man, especially infants, can be avoided by the proper observance of veterinary sanitary measures. The application of these measures to the control of the non-infectious diseases is in the hands of the veterinary practitioner, but unfortunately the practicing veterinarian, like the physician, is usually called upon to cure disease after it has developed and is given little or no opportunity to use his knowledge of prevention.

It does not appear to be as generally appreciated as it should be that it is very often more economical to the individual, as well as to the state, to find the cause of disease and apply the preventive measures than it is to cure the disease after is has developed. Now, this is largely due to several things. For one thing, we do not appreciate the dangers of the disease until the disease has appeared. The disease itself is a tangible thing; the causes of the disease are in most cases intangible—at least to the ordinary observer. Our tendency to depend wholly upon curative measures in combatting disease perhaps comes down to us from former times, when the idea seemed to prevail that disease was something that had to be borne as a visitation, or as something that could not be avoided—that must be taken as a matter of course. For many years men gave all their attention to developing methods for curing disease. The search for curative measures began with the ancients, but it was not until 1796, when Jenner applied his discovery of vaccination for smallpox, that the first advance was made in preventive medicine. But for a long time after that little attention was paid to that side of the question. The invention and perfection of the microscope and the subsequent discovery of bacteria and their relation to disease developed knowledge of value in the prevention as well as in the cure of disease. In fact, much of the knowledge that has come to us today is more valuable in preventing or controlling disease than in curing it. There are some diseases which we can prevent by preventive measures but which, when developed, we cannot cure. We have also learned that drugs are not the only means of combatting disease. Years of search has failed to reveal a drug that will cure tuberculosis, but it has been discovered that much headway can be made against this disease in man with pure air, sunlight, judicious exercise, and plenty of wholesome, nourishing food. The sources of infection are better known and the relation existing between the diseases of animals and the diseases of man is receiving more consideration than formerly and there is great interest today all over the country in milk inspection and in meat inspection.

I said that many of our discoveries were of more value in the prevention of diseases than in the cure of them. Koch was seeking a cure for tuberculosis when he discovered tuberculin, and while this substance was not a success as a curative agent, it has proven most valuable in the control and eradication of tuberculosis in herds of cattle. It is needless to speak here of its value in this connection. It has been used for this purpose since 1890 and has proven most reliable. Attacks are made from time to time on the tuberculin test, but all the men who have had the greatest experience with it are firmly convinced that it is absolutely reliable. Experiments have been under way in the laboratory of the State Livestock Sanitary Board for several years to develop a method of vaccinating cattle that will render them resistant to tuberculosis so that if they should be exposed to infection they will not contract the disease. The great practical value of such a vaccine will be apparent to everyone. These experiments have been so far successful that a vaccine has been produced that will render the treated animals proof against infection, and experiments now under way are to determine how long the protection will last.

The control of contagious diseases of animals is regulated by law in many states. In Pennsylvania, as you know, the enforcement of these laws is in charge of the State Livestock Sanitary Board. Pennsylvania, like several other Eastern states, is more in need of the protection afforded by these laws than some of the other states farther west, because we use several times as many horses and mules and cattle and sheep and swine as we produce. Naturally, it is necessary to go into other parts of the country to get these animals, and in doing this, we are liable to bring infection in with the animals. This frequently occurs with horses. We are called upon at frequent intervals to investigate outbreaks of glanders, and we find in almost every case that the animal which started the outbreak was brought in from the West. For this reason we are continually having outbreaks of glanders, and will continue to have them, because we are continually bringing in horses from other parts of the country. But as long as these cases are promptly reported, and proper methods applied for the stamping out of the disease, it cannot become wide-spread or established here.

Last fall a rather interesting but entirely unwelcome discovery was made in connection with a disease of horses. Horses were found affected with a disease that is generally believed did not exist in this country. This disease is known to veterinarians as epizootic lymphangitis—there is no shorter or plainer name for it. Until a few years ago it was not known to exist among horses and mules in the countries north of the equator. The only territory under the United States government known to contain affected animals was the Philippines. A few years ago when the English troops returned from South Africa after the Boer War they brought this disease with them to England. While it was only found in this State last fall within a few miles of this town, the information we have obtained regarding it indicates that it has existed among horses here for several years. This disease in its mild form has no doubt been mistaken for a simple non-infectious disease of the skin, while the more severe cases have been mistaken for farcy, which is the name given to glanders when it manifests itself by disease of the skin. Up to this time we have found in Pennsylvania about two hundred and fifty cases of epizootic lymphangitis. Of these, ninety were in such condition that it was not deemed advisable to undertake curative treatment and they were destroyed, the owners being compensated for the animals in the manner prescribed by law when it is necessary to destroy animals to prevent the spread of contagious or infectious diseases. The others were placed in quarantine, and of these sixty-three have been cured at this time and are being used under a conditional quarantine.. While they have apparently recovered, they are still kept under supervision so that if the disease should again break out they can be put back in full quarantine. The necessity of the control of animals infected with contagious or infectious diseases has been well demonstrated in connection with this disease. If the owners of the affected animals observe the conditions of the quarantine, and if any other cases which have not been discovered are reported as required by law, it will be possible for this disease to be stamped out and to prevent it from becoming established in this State as a permanent menace to horses and mules.

Another disease that has appeared in Pennsylvania within the last few years among horses and mules is mange. This is a similar disease to scab in sheep and itch in man. It is caused by a small insect that lives upon the skin by sucking blood. When first afflicted with this disease a horse or mule in general health can be used on the road and this is one of the most dangerous features, because the insects which cause the disease can readily transfer themselves from the diseased animal to any healthy animal which may come in contact with the diseased animal; posts, fences and other objects against which the affected horse may rub also become infected with the insects and other horses coming in contact with these objects may become infected with the disease. Harness, curry combs and brushes used on the diseased animal may transmit the disease, and stables occupied by diseased animals harbor the infection. The disease can readily be controlled by keeping diseased horses isolated and by avoiding all objects which may be infested with the parasites. Diseased animals can be cured in a very short time with proper treatment and can then be used without any danger of spreading the disease.

Rabies is a disease which well illustrates what can be done in the way of prevention where nothing can effect a cure. The Pasteur treatment for this disease is no doubt well known to you all. The prime essential in the success of this treatment is its early application, and this in turn depends upon the early determination of the question as to whether or not the suspected dog is affected with the disease. If the head and upper portion of the neck of any suspected dog is forwarded to the laboratory of the State Livestock Sanitary Board it can be determined by examination of the brain and nerve tissue within a few hours whether or not the dog was affected with the disease. Until a short time ago it was necessary to test the brain for the virus of the disease on rabbits, and this test required twelve days or more. In some few cases it is now necessary to make this inoculation test also, but most tests can be determined by the more rapid microscopic method. Whenever the discovery is made that a dog was afflicted with rabies all animals which may have been bitten by this dog are placed in quarantine by the State Livestock Sanitary Board for a period of one hundred days. If the disease does not develop within this time they are then released. This quarantine places all dogs which are likely to develop the disease under the conditions which will prevent them from biting other animals and further spreading the disease should they become affected.

The newer developments in veterinary science have also proven of great service in connection with anthrax and blackleg, two very fatal diseases of cattle. There are certain parts of Pennsylvania where cases of these diseases have been found. Neither anthrax nor blackleg is contagious from one animal to another, but in each case the germ which causes the disease exists in the soil and animals pastured on such ground may become affected with the disease. The soil usually becomes infected with these germs through neglect of properly disposing of carcasses of animals which have died of this disease. The spore of the anthrax bacillus is the most resistant disease-producing agent of which we have knowledge. After the animal has been buried in the ground for years these spores may be brought up to the surface and become attached to grass and other forage which may be growing there, and any animal eating this forage is likely to contract the disease. The spores may be washed out of the soil and float down a stream and animals drinking the water may contract the disease. You will see from this that one of the essentials in controlling this disease is a proper disposition of the carcasses and a thorough disinfection of any ground surface, or of any premises which may have been contaminated with blood or other discharges from an animal affected with the disease. When an animal is dead of anthrax it is a mistake to hold a postmortem examination, because the person doing this not only runs a risk of infecting himself with the disease, but the germs which are contained in the blood will develop spores, and as these spores or seeds are much more resistant to conditions outside of the body than the germs, the ground or premises are therefore almost certain to be infected. The carcass of an animal should be disposed of by burning or should be buried at least four feet below the surface and should be covered with quicklime. Stones or timber should be thrown over the ground above the grave to prevent dogs digging into the carcass, and to prevent animals from grazing over the surface. There is a vaccine which can be applied to protect cattle against infection with this disease. This vaccine should never be used until it has been positively determined that the disease exists in the pasture or on the farm; otherwise, the disease may be introduced into localities which are free from it. An incident was brought to my attention the other day which illustrates the length of time articles or places infected with the germs of anthrax remain dangerous. On a certain farm there were several cases of anthrax in cattle in 1906. The cattle remaining on the place were vaccinated in 1906 and were again vaccinated last year. No further losses from the disease have occurred. There is on the farm an old wagon which was used in 1906 to haul away the carcasses of the animals that died at that time. After being used for this purpose it was put away until about two months ago. At that time the owner decided that he would take it out for some reason or other, and about ten days of two weeks later he developed an anthrax pustule on one of his arms and came very near dying of the disease.

Blackleg is similar in many respects to anthrax. The bacillus which causes the disease lives in the soil and the infection is obtained from the soil. The same precaution in disposing of carcasses of animals dead of this disease is therefore necessary. Animals which are kept on infected ground can also be protected from this disease by vaccination.

Another disease which has many features in common with anthrax and blackleg is hemorrhagic septicaemia. The bacillus which causes this disease also makes its home in the soil, and the appearance of the organs and tissue of an animal which has died of this disease is similar in many respects to those of an animal dead of anthrax. Unfortunately, however, we have as yet no vaccine that can be used to protect animals from this disease. Cases of this disease have been met with in the mountainous parts of the State.

In bringing these matters to your attention, I have mentioned in a general way some of the work which is being done by the State Livestock Sanitary Board. There are two other lines of work in which the Board is engaged to which I have not referred, namely: the licensing of stallions and meat inspection. I will have nothing to say in regard to the work in connection with horse breeding as Dr. Gay, who is in charge of that work, is on the program at a subsequent session.

Concerning meat inspection, you are perhaps all familiar with the fact that the last legislature passed an act authorizing the State Livestock Sanitary Board to establish and administer a Meat Hygiene Service, and providing ten agents to do the work. Of course, ten men cannot examine all of the meats slaughtered or sold in Pennsylvania, but they can exercise considerable supervision over the slaughter-houses and meat markets and see that the sanitary conditions at these establishments are what they should be; and they can also examine a large number of the animals slaughtered for food, and a great amount of the meats and meat products. The act authorizes the establishment of local meat inspection in cities, and boroughs and townships of the first class, the idea being that the local authorities can look after this work within their jurisdiction and that the ten state agents can devote their attention to the work in unorganized localities. A state meat inspection service will always be necessary because many slaughter-houses are located just outside the limits of a city or borough. The purpose of this meat inspection law is twofold; one is to insure to the consumer a wholesome meat product, and the other to give home-grown and home-slaughtered meats the same standing with the consumer as meat which is shipped into the State from the large abattoirs in the West, which are under the inspection of veterinarians in the employ of the United States Bureau of Animal Industry. You are, no doubt, aware that slaughter-houses doing an interstate business are under the inspection of the Bureau of Animal Industry, and that their products are marked with a stamp. A great many people have come to know that meats marked in this manner are produced under the best conditions possible, and there is a preference for the meats bearing the government stamp, especially in the larger cities. Anything that will improve the character, and increase the demand for home-slaughtered meats will enlarge the market for home-grown animals.

The CHAIRMAN: We will devote ten minutes of our time to questions.

A Member: I would like to ask the Doctor how we can detect the presence of anthrax?

DR. KLEIN: There are three types of this disease. In the acute type death is very sudden and no symptoms are observed. In the sub-acute type there is fever with all the symptoms that accompany it, blood spots in the membranes lining the eyelids and nostrils, and sometimes bloody discharges. There are also other symptoms: the character of these will depend upon the organ or organs which are most affected. In the chronic type the disease usually appears with a pustule in the skin. On post-mortem examination the spleen will be very large and the various organs and tissues will contain blood spots will occur in hemorrhagic septicaemia, but in this disease the spleen is not enlarged. There are some cases which are not typical, and it is then necessary to make a bacteriological examination. In such cases it is well to cut off an ear of the animal and send it to the laboratory for examination.

DR. HUNT: Would you advise people to make this examination themselves, or even to cut off an ear?

DR. KLEIN: No, I would not advise the holding of post-mortem examination for reasons which I have already stated. If a veterinarian cannot be secured to make an examination and give information regarding the cause of death, an ear could be cut off by the owner and forwarded to the laboratory of the State Livestock Sanitary Board, but in doing this every precaution should be taken to prevent any blood being spilled upon the ground, and the ear should be securely wrapped so that none of the material could escape from the package, and packed in such a manner that the package will arrive at the laboratory in a fresh condition. Anthrax is a very dangerous disease to man as well as to animals and no one without training or experience should undertake to deal with it.

MR. WELD: In bringing cattle for breeding purposes from another state is there an age limit under which they can be brought in without inspection? If so, what is the age?

DR. KLEIN: Cattle of all ages which are intended for breeding purposes or dairy purposes are required to have a certificate of inspection and tuberculin test from a certified inspector, or a permit from the State Livestock Sanitary Board, authorizing their shipment in quarantine to destination to be inspected and tested with tuberculin after their arrival. Certificates of inspection are not accepted for calves under four months of age because the tuberculin test is not reliable when applied to animals under that age; but such animals can be brought in on a permit and kept in quarantine until they have passed the age of four months when they can be inspected and tested with tuberculin. If a calf shipped in under four months of age has come from a herd which has been tested with tuberculin within a year and found to be free from disease, and a satisfactory report of the test is submitted to the Board, the calf may be admitted without a tuberculin test.

MRS. ALLEN: Regarding anthrax. Is not the germ destroyed by sunlight, the same as other germs?

DR. KLEIN: The bacillus of anthrax is not more resistant to external conditions than many other germs, but it is not the germ with which we have to contend but the spores or seeds of the germ. Sunlight would not destroy the spore.

MR. KESTER: Is burning the carcass of any avail?

DR. KLEIN: It is perhaps the best way to dispose of a carcass, but it is not practicable in many cases. Usually it is found more convenient to bury the carcass. The hole should be dug deep enough so that the carcass will be at least four feet below the surface of the ground, and it should be covered with quicklime and a lot of stones or old timber should be thrown on top of the ground and around it to prevent dogs from digging in it, and to prevent anything from growing there. These graves should not be located in places that are subject to overflow from ponds or streams.

A Member: Is the disease known as lumpy jaw contagious, or is it the same as tuberculosis?

DR. KLEIN: Lumpy jaw is not contagious from one animal to another, but if the discharge from the tumor is permitted to fall upon grass or fodder, animals feeding on the contaminated material may contract the disease. The disease is caused by fungus which vegetates on grass and other fodder, and if such fodder is taken into the mouth and there is a sore or wound in the lining membrane of the mouth through which the fungus can enter, the disease may be produced. It is a different disease entirely from tuberculosis.

MR. BRODHEAD: If a man had a wound in the hand and opened an animal which died of anthrax would he take the disease?

DR. KLEIN: He would run a very great risk of contracting the disease. Should there be an injury or opening in the skin of his hand or arm by which some of the germs or spores could enter, he would very likely be affected.

SECRETARY CRITCHFIELD: Is there any danger to the human system in using the milk of a cow afflicted with lumpy jaw?

DR. KLEIN: Where the disease is localized in the jaw and the tumor is not discharging there would be no danger. If a tumor on the jaw or about the throat is discharging, or if the udder is affected with the disease, the milk should not be used.

MR. HUTCHISON: Is it not better to destroy the animals at once when they are affected with anthrax?

DR. KLEIN: It is. As soon as it has been established that an animal has been affected with anthrax it should be destroyed, because the longer an animal is permitted to live the more infection it is likely to spread about the premises.

DR. CONARD: In 1889, in my neighborhood, there was an outbreak of anthrax. At that time there was little known of the disease and the necessity of destroying the carcass. The animals that died were buried at the head of a stream, and every once in a while since then there have been outbreaks of the disease along the meadows of that stream. The largest meadow is about three miles below and there have been outbreaks in that meadow continually. Now I would like to know whether it is possible or probable that the carcasses buried at the head of that stream may be the cause of this.

DR. KLEIN: I think is it. The anthrax bacillus lives and reproduces itself in the ground as well as in the animal body. This is something that is not usual with disease producing germs. The anthrax germs seem to thrive almost as well in the ground as in the animal itself.

A Member: Can the disease be produced by cattle drinking water from a tannery?

DR. KLEIN: Yes, if the hides from animals dead of anthrax are tanned in a tannery the spores will pass out with the waste discharges from the tannery and may render the stream infectious.

MR. HUTCHISON: The State College made an investigation of an outbreak of anthrax at Ridgway in 1899, and I know it was thought then that the disease came from a tannery.

DR. KLEIN: In Delaware an outbreak of anthrax occurred on several farms where trimmings from hides which were obtained from a local tannery had been spread over the ground for fertilizer.

DR. CONARD: Can anthrax be carried by buzzards?

DR. KLEIN: There is a good reason to believe that birds feeding upon carcasses of animals dead of anthrax can carry the infection on their feet.

The CHAIRMAN: I am sorry to break off this discussion, but it is necessary to go on with our program. We will now take up the next number on our program—an address by Dr. Detrich on "The Acre and the Market."

The address is as follows:

THE ACRE AND THE MARKET.

BY DR. J. D. DETRICH, *Scranton, Pa.*

It was a great treat, I assure you, for me to hear Dr. Hunt, Dean of the State College of Pennsylvania, deliver his excellent and timely address on the subject of the soil yesterday evening, and then to have Professor Carr, of Washington, D. C., take up the same subject and discuss it from a different standpoint; while it falls to my lot to talk on the "Acre and the Market," this morning and give my field experience in handling the soil and disposing of its products.

It is not my intention to talk to the man who grows the rose and carnation under glass, neither to the man who has a row of bean poles across his acre with a flourishing growth of strawberries on the one side and cabbages on the other; nor do I intend to speak to the orchardist, with his acres set in choice trees to grow fine fruits for the market; but to the Pennsylvania farmer, who has a barn on his farm. Much as I appreciate the whole range of agriculture, in all its branches of fruits and flowers, harvests and forests, I feel that it is the general farmer, the grower of our staple crops, that needs to have the acre and the market treated from the standpoint of fertility and the dollar in relation to the pocket of the farmer, who suffers most from a depleted acre as the cause of the trite saying that "farming does'nt pay."

We hear so much in these days of specialized farming and the financial returns from an acre when so treated, that it scarcely seems possible that the broad acres of our farms should fail to yield their increase, when men, teams and machinery are at hand to simplify the operations and advance the cause of agriculture.

The man who grows the foods, which supply a nation needs no apology for his occupation. He is engaged in a noble calling and for this reason he and his occupation are worthy of our attention as agricultural institute lecturers and teachers of farming. What greater work is there then for agriculturists than to supply the needs of the human body? Consider for a moment the failure of any one of our staple crops; what it means? Eighty millions of people to be deprived of bread; and yet our aim in all our work should not be only to grow crops but men. No one on the farm knows better than myself that the soul must bend to serve the body, and the sooner the mind of man realizes the situation, will it control the problems of life more reverently and intelligently.

I want to talk this morning to the general farmer who raises the substantial foods of man; to the husbandman who has a barn on his farm, in which the live stock turn the raw material of the acre into the finished product, of meat, milk, eggs and fleece, as well as produce the most valuable by-product for the farm in the world, and that by-product is stable manure, for the acre. The whole secret of successful agriculture lays largely in the fact that the farmer becomes a manufacturer, situated as he is, with a barn on his farm, using it as our fathers did of old, for the storage of crops, but instead of selling all the corn, wheat, oats and hay direct from the storage barn to the market, the time has come for the good of his acre that he must quit selling all the raw products of the acre and convert his storage barn into a factory to make manure for the acre and money for his pocket. It seems to me that there is something in general farming that is deserving of a great deal more attention than it usually receives, and that something is, the acre. The man who has a barn on his farm and is engaged in growing the staple crop is very differently situated from the market gardener, the orchardist, the grower of small fruits, the wheat farmer of our western prairies, the ornamental gardener, the rose grower and even the ranchman of our plains, from the very fact that the general farmer of the East today must feed his soil from his barn. The farmer of Pennsylvania can not compete with his fellow-farmer of the Dakotas in raising wheat. All the other lines of agriculture can afford to pay for the high priced nitrate of soda. The vegetable gardener, with his asparagus can afford to use all the nitrate of soda that his crop can possibly use, so can the rose grower, while the ranchman does not need it at all, neither does the prairie wheat grower, but the general farmer with the prices that his crops bring in the market cannot afford to grow the nine, ten months and year crop with the high priced fertilizers. The man with the barn on his farm is most peculiarly situated from every other tiller of the soil, in so far as keeping up the fertility of the acre is concerned. The farmer of the present day can with his barn as a factory restore the farm to a state of richness that surpasses the virgin soil. I feel that agriculture has been taken up by the scientists in this century, and that science is doing for the farmer what it did for the manufacturer in the last century. The scientist has told the farmer what a balance ration is both for the animal and the acre a thing which no body in the world knew 50 years ago. The scientist has told the farmer the four plant foods he must furnish: nitrogen, phosphoric acid, potash and lime, as well as the indispensible humus. The whole range of animal industry, plant and soil is receiving the attention of our agricultural colleges and experiment stations in behalf of the farmer. The inventor too of agricultural implements has kept pace with mechanical devices of every description for cultivating and harvesting crops. Yet in spite of all that has been done, the acre is producing less and the soil becoming more exhausted of its plant food. Being deeply impressed with the two lecturers who have preceded me on the subject of the soil, I feel like adding my experience to the situation and give my own practice in handling the acre, and in this way express my sincere debt of gratitude that I owe to the agricultural colleges and experiment stations both of Europe and America.

The general crop grower for the purpose of making farming pay, must get it out of the acre. I have been convinced long ago that the farmer must cheapen production and the only possible way for him to do it is to make the acre produce more. The question is often asked, does farming pay? and the only basic reply is, that depends on the acre. The western wheat grower gets his prosperity out of the acre and so must the eastern farmer. But the grain grower of the West has a very different acre of fertility from the wornout acre of the East. The farmer's lot of this State is quite a different proposition with a barn on his farm and that of his western competitor with a header and a steam thresher in his field, burning the straw for fuel to thresh his crop, bag the grain then and there; haul it to the elevator and pocket the money. The only reason the western farmer can do it is, because of his acre; the western acre drives the eastern acre out of the market. The eastern acre with its 5, 7, even 10 or more farm buildings and expensive fence, cannot expect to compete where taxes are high, fertilizers must be purchased and sell the raw crop of his acre like the grain grower of the West.

Seeing then that the conditions of the eastern and western farmer are so different, and at the same time that the man with the barn on his farm has such a different problem from the trucker, fruit grower, and gardener, I think it is very desirable to take up the acre of the farmer with the barn on his farm and discuss the acre and the market in relation to the farmer of Pennsylvania, as that is our work as lecturers and agricultural institute teachers.

I wish it to be particularly understood that I am not going to include in this discussion any other kind of farming than that of the acre which has a barn on the farm, not that I despise the other departments of the soil, but it seems to me that there is something in general farming that has been most seriously overlooked and is deserving of a great deal more attention, and that is that the barn on the eastern farm must be converted into a factory. The sooner that a farmer of the present day realizes that he is not simply a crop grower, but that he is in the full sense of the word a soil maker, will he see the necessity of changing the old time honored barn into a factory. Farming is becoming more complex than what it used to be, the times and society demand it, the farmer is just shaking off the swaddling clothes of the splendid industry and must turn his barn into a complete factory for manufacturing of hay, grain and legumes into the best meat, the cleanest milk, the freshest eggs and the very best of manure. This is the problem of the Pennsylvania farmer today. Some say that the agricultural institute lecturers must get new subjects. I promise you I will never change mine till I see the man with a barn on his farm having that barn turned into a farm factory, with his silos set at one end, his mows filled to the roof, his two lines of cattle housed conveniently and comfortably in a well lighted and healthfully ventilated barn, converting the contents of the mows and silos into dollars for the farmer's pocket and good manure for the acre. The barn, I repeat, it is no longer a mere store-house for crops. If it is continued in that capacity alone, I will ensure you that the acre will get poorer than it is. It is not the farm that makes the acre poor or rich, but it is the barn that turns the acre into either poverty or fertility, just as the farmer decides to run his factory either in the interest of his farm and market or for the weeds and killdeers to occupy his acre. There is a saying among merchants, if you buy right you can always sell right. If the farmer grows the crop, he always has it to sell, but if he has no crop it matters not what advantageous prices the crops are bringing, he has none to sell. It is easily seen that the acre is the basic source of profit; and yet that the farmer has just as much money for an acre of wheat when it produces 20 bushels per acre at a $1.00, as when he gets 40 bushels per acre and wheat is only 50 cents per bushel. But that kind of argument is very much like the man who said when it was raining, he could not put a roof on his house and when it was not raining he did not need it. If a farmer is inclined to argue himself into such fallacy he has the material at hand to go into farming almost any day. But the whole matter simply resolves itself back to the acre; and the man with a barn on his farm, turned into a factory for making two products, milk and manure, this is the line on which I farmed, yet I hold it would be equally true with either branches of animal industry in connection with the acre. I have given up all hope of legislation ever doing very much for the farmer, but I can see that the well being of the people and the laws of the land are depending, on the other hand, very largely on the acre. If the acre is made to produce, and that is taught both by science and practice that it can be done, then it only remains for the farmer to grasp the situation and do it. The watch maker one time only had a shop; now it is the factory that makes a watch; the factory has been able to cheapen production to such an extent that almost every citizen who wants to carry a timepiece, the cost of it is within his means to do so. It is just the same with the acre. I do not believe the people of towns and cities can afford to pay much more for the products of the farmer than they are at present. I have gone to dairies in the city where milk is retailed by the pint and quart to see who would buy and in what quantities, and from the looks of the men, women and children, pitchers with handles broken off, broken cups, mugs, kettles, paint cans and earthen ware, all turned into service for taking home milk from the city retail dairies. Rents and taxes regulate wages to a large extent in towns and cities, and these in turn influence the price of living and I cannot see how the market price of the farmer's produce is going to be much higher, so that the farmer is shut up to the fact that the acre must be his hopeful source of real profit.

It is for this reason that I have taken up this subject in the interest of the farmer to show him that he holds today in his own hand the only source of wealth which the increased production of the acre is accomplishing, turning his barn into a factory, and make a product for the market and also make the most valuable by-product that is known to science and farm practice, namely, stable manure. I think that Professor Thorne who delivered the fourth lecture on soil at this convention, with a chart of actual experiments dating back into the last century, showed that the manure made from animals varied in value from $1.50 per ton up to $5.00. And here it is, strange to say, that the variation was not in the animals, but in man's care of it. Here are four lectures on soil, all from a different standpoint at this convention, and yet every one is a strong plea for the acre and its possible increase in productiveness, depending upon the farmer turning his barn into a factory and taking just as good care of the manure as he does of the milk. Two thirds of Prof. Thorne's invaluable lecture to the sane farmer was taken up in showing the frightful loss of manure by the wasteful methods of farmers in throwing manure in heaps, in open barnyards and not covered barnyards. The Professor would then say in going over the different experiments, and this was taken direct from the stable with both the solid and liquid manure saved in water tight gutters and proves to be of very high value. Why, gentlemen, there could be no more conclusive facts or arguments taken actually from field-tests and showed to the farmers of Pennsylvania than those facts and figures of Prof. Thorne. In addition to all that Prof. Thorne said, I am the living exponent of turning the old farm barn into the farm factory and developing the acre from a run down and depleted condition into six and eight tons of hay per acre as well as thirty tons of ensilage and 49 bushels of rye per acre. Not only this increased yield per acre, but got two, three and even four crops of clover hay in a season. Now, fellow farmers, I hold this is the clew to the question whether farming is profitable, and the answer is that it depends on the acre. If I could so change the production of the fifteen acre farm at Flourtown that instead of only keeping two cows and one horse when I went on that farm and farmed it the first year at that rate and soon nothing but hounding poverty staring me in the face. I quit the miserable business of one animal to every five acres, turned my barn into a manure and butter factory and made five acres support ten head of live stock in roughage and bedding, summing up thirty head of cattle and two horses where twenty years before I had only the two cows and one horse and bought hay. Is it any wonder that I want to talk to the farmer with a barn on his farm. He has in his barn, not in his field, the whole secret of the question of the acre and the market. If the steel knives of the cutter cut the crops and the teeth of the live stock crush it and the stomachs of the animals soak it, it is in the best possible condition for a fertilizer when taken direct from the stable to the field to enrich the acre that is in the world. Stable manure has proved, when the best feed is fed and both the solid and liquid manure all saved and spread directly on the acre that there is no plant food in the world like it, much less equal to it. Not only that it is quick to act, but it lasts longer than any known plant food in the soil and is the only complete manure in itself because it has that inestimable quality in it, known as humus.

Now, fellow farmers, look at it again. The fertilizer agent comes around and talks up fertilizers, they are all right in a way, but I want to go on record and say right here that they are not the plant foods for the general farmer to rely upon; if he does, his soil will come to grief. Fertilizers have their use for the vegetable gardeners, and legumes have their sphere in the round of catch crops as green manure, but for the farmer with a barn on his farm to depend on them is a mistake; it pays him far better to run his legume through a cow and get a profit out of it both in milk and manure, while if the legume is turned under he will get a lop-sided manure of nitrogen and humus only, without phosphoric acid and potash, while if the cow were to masticate it she is the best fertilizer mixer in the world for the acre, and when she is done with it it has all the ingredients of plant food. Gentlemen, this is not talk, it is the acre rising out of poverty into prosperity and covering our fields with living green. I see the temptation for a farmer to go to his acre with a bag of manure, but it is as big a fraud on the American farmer as the orator who said the potato crop was a curse to Ireland. Fertilizers are too dear for the farm crops, they will do for truckers, vegetable gardeners, yet the farmer prefers to buy a bag full of dirt for $1.50 rather than buy a bag of feed for his animal—had he bought the feed for the cow he would have had both fertilizer and milk.

Suppose a farmer does get twenty or twenty-five bushels of wheat or rye by the use of fertilizer, what a measly crop that is compared to forty bushels of rye to the acre and then the rye acre ready for another crop. But our twenty bushel crop completely exhausted the acre with little or no humus left in the soil, the winter rains begin to wash the field, it is cut into big and little gullies to be mowed over next year to the jarring and straining of machines going over the rough field, with a mere apology at best for a hay crop, consisting of tall woody white top weeds, short clover, what is of it, and little short headed sickly timothy, with little or no nutriment in such strained grass crops. When the man has a barn factory on his farm he can fatten a crop, just as he can fatten poultry or swine. Well fed crops, feed stock; you can't feed the trimmings of an apple orchard and get a big flow of milk, it is simply out of the question for the general farmer to talk about prosperity till his field grows from four to eight tons of hay to the acre. I would not be bothered with a one crop eastern farm, it is only a nuisance and an expense. But when a farmer gets into the manure and butter factory business he can just practically own a second farm by setting one acre under the other. If he by his system of farming makes his soil from four to five inches deeper, and it is much cheaper for him to do it than go and buy a farm alongside of the one he has, for it will only take him half as long to work his double acre farm as it will to work his two acre farm, and he will get more from his double acre than he will from his two acres.

This was my plan to make my few acres double, triple and quadruple their crops so that I would have a farm equal to three or four times its real size. It was in this economy of land and labor that the small farm worked out the practical results so satisfactorily. I manured, plowed, harrowed and cultivated an acre to get as much as grows on three, four or more ordinary acres. The expense to plow an acre is only one third as much as when three have to be plowed, then too when the weather is just right it takes less time to seed an acre than it does three or four. So that every fact is in favor of the acre solving the question of the market both in respect to outlay and income. But there are farmers buying bag manure to grow crops as they will call it, let their mows empty, silos half filled and their barn is an unused factory, simply storing a few loads of inferior crops, and the acre at most is dusted with about a half grain of fertilizer to the square inch and no humus. Is it any wonder that farming does not pay? This is the unfortunate kind of farming for the acre and the owner—then talk against the farm paper, the Institute lecturer and agricultural college, as being book farming; why, there could be no worse system of farming than that which robs the acre and impoverishes its owner.

The legume crop which is extolled so highly for nitrogen and humus is all right as far as it goes, but suppose scarlet clover sown in corn will give an increase the next year in corn of fifteen bushels, that a field that yielded twenty-five bushels of corn per acre, when seeded to scarlet clover at the last working of the corn grew forty bushels per acre. I don't call that business farming; it's true there is a gain of fifteen bushels, but suppose the scarlet clover had been fed to live stock and the manure cared for, both solid and liquid, and taken to the field, the farmer would have just as much manure and the manure in a much better shape for plant and food; at the same time increase of flesh, milk or eggs as the case may be. Such legume farming is a mere makeshift compared to stable manure farming. I think it is a pity for any energetic man to waste his time with a fifteen bushel improvement when he might just as well have a hundred bushels per acre and have a lot of market produce as well as the manure.

Again it is much easier to get an acre to produce a higher crop than it is to get a cow to yield a big and continuous milk flow. The thoroughbred acre is much more easily to breed-up than the thoroughbred cow. I will guarantee to take any farmable land and bring it into a state of good fertility in from three to five years, providing the soil has not anything about it that is strictly wrong constitutionally, so sure am I that soil can be built up to a state surpassing even its virgin fertility; but I would not think of doing it with commercial fertilizers, nor with legume crops, but I am sure it can be done profitably when the farm barn is turned into a factory—I did it both on a little and on a big farm.

About the same time I started the Flourtown farm there was a big advertisement by a fertilizer firm that it was going to run a profitable grain farm in connection with their fertilizer plant as an advertisement to show farmers how a practical grain growing farm could be made to pay near Philadelphia, Pa., by using absolutely nothing but their own high grade fertilizer as an illustration of the efficiency of fertilizer for farm crops. The farm was splendidly equipped with the best modern machinery, but after a short time the crops became poorer and poorer, the great expectations vanished and the machinery sold; while the little fifteen acre dairy farm was flying her colors of green and gold over her acres at Flourtown, that had been fed fresh stable manure, and no fertilizer. A fertilizer agent came over to see me and said if I could say my crop of growing corn was the result of his fertilizer he would give me $500.00. And here it is, in the farmer's own power, to make his farm produce any and every season whether wet or dry if he gets to work and starts his farm factory making a produce for the farmer and a by-product for the farm.

Then there is another way to explain the crops at the Flourtown farm by saying that if every man was a Doctor Detrich then it could be done, that it was the man that did it, not the plant food, not the dairy cow, not the system. While it is very nice to have bouquets thrown at you, I do not accept the compliment, for I know that when other people try and do the same thing, they get like results to my own experience. I can show in every instance where any person has followed the method that was carried on at the 15 acre farm and also at the 340 acre farm, that just in that same degree, did improvement follow their efforts.

To illustrate the system of ripening a field for a crop, take a piece of ground that is practically a run down farm, and I will tell you exactly how you can bring it up to grow good first crops in three years, and good first and second crops in five years, and good first, second and third crops from five to seven years; and if the farm is still kept up and handled as soil ought to be it will grow a fourth crop of grass in a season. Proceed as follows: If the field is a sod of some kind I know nothing better to start with than corn, for first and foremost soil needs air, all neglected soil needs air, it is generally lifeless because there is little or no air in it. Then too there is no sunlight in it, sunlight is one of the other, place a plant in the cellar in the dark, give it all the air you can, it will soon show that the sun is an element that is needed as well as air. Heat may be kept out of the soil or it may be added and its presence or absence is noticeable. So that what a practical farmer wants is to get all the natural conditions of air, sun and heat right, as well as nourishment, for 96 per cent. of a plant's growth is derived from the air and a farmer must learn to manage these air derived elements by treating the soil. The farmer must so handle his farm that he can bring to pass fertility in the following manner: If the field is a worn out sod, it should be manured with the best stable manure to be had and then plowed under; it may be manured in the fall; winter or spring, but do not plow it in the fall, do not plow it deeper than the soil at most—4 to 4½ inches deep, harrow it very well, see that all stones, stumps, sticks, tin cans, wire and trash of any and every kind are off the field before it is planted as well as fill up all holes and gullies that the plow and harrow have not been able to level, so that the farm starts to hold and to carry as much water as is possible for the good of the plant, providing it is a well drained field. It is a mistake to plow wet ground and a bigger mistake to manure it and a still bigger one to seed it. Wet ground is simply impossible cropping. The corn ground should be very fine and mellow when planted so the weeder can be run over it the third day after planting it. Kill a weed before it is born, should be tacked up on every cultivated field; keep the weeds out at all hazards; if you think that it will be an advantage to drill in 200 lbs. of high grade fertilizer, it may be money well spent to start things along, but I would not recommend it as business goes on, or fertilizer is an expensive measure, considering the returns derived from it in the long run. After the season is over and the corn cut for ensilage it is better than to truck it, for you want the field clean so as to seed it in the fall to rye by proceeding as follows: On fortieth degree of latitude in a climate about like that of Philadelphia the corn being all taken off the field; hitch a team to the two-horse riding cultivator or spring tooth harrow, but I prefer the riding cultivator as the corn stules catch in the spring tooth harrow more or less and cause it to cultivate unevenly, but the riding harrow works up and down the rows exactly as though it were working the growing corn. This metod of working the soil into a seed bed is very much better than to plow the cornfield and turn up the old soggy roots of corn stalks. These roots are very much better because of their soggy nature not to be disturbed and to remain untouched in the soil for holding moisture and prevent washing. The cultivated soil that also has been worked up all summer in the cultivating of the corn, is in that fine dust seed bed condition to receive the rye, much better than to have plowed the corn stalks, then harrowed, seeded and rolled the ground to get it even, as is the general custom of farmers. As soon as the corn-stalk ground has been worked sufficiently to get enough of fine soil to cover the rye, take the grain drill set it to sow two bushels of rye to the acre, pull the lever and set the drill hoes in a zigzag position and drill in the rye any time before the 10th of October in the latitude of Philadelphia. As soon as the rye is drilled and the work of seeding is done do not roll the field, the rains and mows will make the field hard enough till spring; keep the surface so that plenty of water soaks into the ground; and it is a lesson to see how much water such an unplowed corn stalk field can hold, it is in a fine condition to take in the snows and rains of winter and hold an immense amount of it, for rye is a heavy drinker. When the work of seeding the field is done, begin the next morning if you work to top dress the seeded rye with freshly made stable manure, have direct from the stable to the field at the rate of six to eight spreader loads to the acre; if the bedding is cut fine it absorbs the liquid manure better, spreads better in the field and lays closer to the ground. Short manure always gets closer to the plant than rough strawy manure, the field not having been plowed the manure spreader will cut in very little, so that it is not more work for two good horses than ordinary field spreading; keep on top dressing the rye 'till the field is done, only putting the manure elsewhere when the field would be too soft or wet to get on with the team; the manure may be spread from a low down truck with broad wheels by hand, only that it is more work than machine spreading. By putting the manure fresh from the dairy barn on the field, with short litter, as an absorbent, it is weathered finely, the rye comes up through the manure and grows a fine crop. I know what is said about so much seed to the acre, but what I want is a stalk of rye from a single grain if I can get it, the rye and manure are both to mulch the field, the rye is the growing and manure the decaying mulch—the following spring cut the rye green for the sake of the field, for it is the ground that the rye of the farmer is watching and working to get into a high state of cultivation for he has started out to improve his soil and must never give it up till he gets it fertile. If the rye is cut for feeding green to cattle, it is all right; if it is put into a silo it is all right; if it is cut for hay just when the rye is in the first bloom it is all right, but if in the early spring the corn stalk field seeded to rye is plowed and seeded to oats and peas at the rate of two bushels each or 54 quarts of each as the grain drills usually gauge the drilling of peas and oats it is the best way to handle it. It is said by some that peas and oats can be mixed and sown together at the same time, but my plan has always been to put the Canada field peas in at least three inches deep and oats only one inch. To do this they have to be sown separately, the one long ways, the other cross ways, the peas first and then the oats, as soon as the peas are in begin at once to put in the oats. In about six weeks the oats and peas should be put into a silo or made into hay, if for hay, they should be cut just when here and there in the blooming and podding field a pea is seen in the pod, when the pea is just forming like a small button, is the time to cut for hay, if the peas get big in the pods, they cannot be cured enough for hay and will mold when put into a mow or rick. After the oats and pea crop is off the field, manure the field and plow it a little deeper, say one inch, than it was plowed for corn, turn the manure under any time so as to get it ready by August 20th, in latitude of Philadelphia; if the field is loam of the limestone type, but if it is red shale and has to be plowed in lands owing to the drainage, it is best to seed to grass ten days or two weeks earlier. The farmer must keep his rye on his soil and adopt his farming to his field, if he does not, he only delays progress. Again, if his soil is inclined to hold too much water as many of the shale soils do, do not bother with red clover in the grass mixture but sow alsike, it being a much smaller seed than red clover, two to three quarts of alsike to the acre. But for the regular grass mixture sow six quarts of red clover, five quarts of timothy, two and a half pounds of alsike, and one pound of red top, sow this mixture broadcast over an acre as evenly as possible on well prepared ground, with any broadcast seed sower and harrow it in with a weeder going over it only once, do not roll the field unless rolling after seeding on your ground does well, let the field alone till about June 15th of the following year, then cut the grass, make it into hay as soon as the hay is off, begin to top dress the field with manure with about the same amount of spreader loads, just as soon as the red clover heads appear over the field clip the field, do not wait till a few turn brown, clip it, but above all things don't pasture it, if the clover heads appear in a few weeks again, setting the mowing machine just high enough to escape cutting the crown of the clover stalks; if it is necessary to clip more than twice clip, do not neglect clipping any more than you neglected seeding or mowing, let the field go into winter quarters manured and mulched, if the manure is not put on the field till in fall and winter, be sure and clip whenever the clover heads appear, do not wait till some turn brown or still worse black, clip when in bloom.

The manure may be put on any time before it's too late in the spring, but in my experience the sooner the better after the hay crop is off the field. The field is laid over in this way for second year's mowing, having been clipped and top dressed; the second year's mowing ought to be a good one and as soon as it is made into hay, top dress it again, to be put into corn the following spring, but if any timothy or clover heads appear, clip them off. Don't pasture this sod which will begin to look like a field ought to look, but clip it, remember you are bringing up a piece of poor ground to be a good ground and one mistake may delay all the best efforts, put forth in three years—just be as careful of sod for culm as for mowing.

During this ripening of the field for a crop, it has had a manuring for every crop, it had two plowings the summer it was seeded for grass, one for the oats and peas, and then the plowing for grass; it had three top dressings, and two manurings plowed under; it had in three years eight different kinds of roots all reaching different depths in the soil, the deep thick rooting clovers. the strong corn roots, the fine winter rye, the pea root, reaching deeper than the oats roots, the oats, the shallow root, with the grasses work the top soil into the finest mechanical condition their countless rootlets. Plant roots are the under ground harrows, the soil never having been pastured has left the seed bed made by harrowing and pulverizing two years before in fact. I will be very much surprised if a field is not ripened for any crop by this time, it is on the way rapidly to grow heavy crops in the future. I have tried this plan for years, it has never failed; I have had others try it and it has not failed. I give it to you today for a certainty in restoring soil from an unproductive to a productive state. I call it ripening a field for a crop because I have no better name to express it. Once a field has attained this notch of fertility it can still be carried on to the profit of the farmer.

The reason that I prefer oats and peas is owing to the fact, that it is such a fine cleaning crop, it cleans a field better than any crop I know, the spring weeds smother under it, for it is a half trailing crop and the weeds start on the stubble only to be turned under by the plow so that weeds have been kept down in the process. I pay no attention to rotation; used to do it, but quit it because there is nothing in it in my system of farming. I can not afford to fool around rotation, too many American farmers have been rotated enough, if nothing else. I want a working system that feeds soil and live stock and lifts mortgages. I also believe in selling all the timothy hay that grows on the farm, and as long as I farm I will raise it. Its roots are great soil harrowers if fed, they will do a work for the physical and mechanical condition of soil that I can get in no other way, they will not take the place of clover and just as little will clover take the place or do the work of timothy. Timothy never can do its soil work in one year, clover can; but it takes timothy two, and then it can not do it unless it is fall or early winter, fed with manure that lays close to the ground, like dead leaves pack in forests and make regretable mold for oaks, it is then and only then that timothy will do its best work along with red top. These two grasses put a fine texture and finish on soil—the third year timothy retreats and leaves the field largely to red-top, which toughens a sod but in my experience does not leave the soil in the pliable and friable condition it ought to be—the working of timothy in the soil is different from red-top, timothy is inclined to bunch the second year, red-top closes up the space between the bunches but under favorable and unfavorable treatment both these grasses appear very differently in their field service; their uses up to a certain point, like in everything else can not be disputed but highly appreciated.

Fellow-farmers, I would like you to see a field that has been treated in the manner I have just described to you at the end of three years—a field of little or no soil will respond to treatment of that kind, for in three years I have turned ground into soil, while a piece of ground rotated as has been both preached and practiced for many previous years has simply paralyzed the farms of the Eastern and Middle states. I say give live stock half the care, feed and grooming that horses get (and most of them get none too much), there wiil be a different story to tell about the farm in three years' time. If the farmer gets more out of the acre, I am sure he will be able then to get more out of the market. There is much talk about the advanced registry cow, but I can breed a farm up to produce four tons of hay easier than a farmer can breed a herd of cows, each one making fourteen pounds of butter a piece in seven days. I have tried both, and the herd registries of Europe and America are not crowded with such cows after several centuries of breeding—but the acres on the big and little farm were equally productive; there was no difference there between upland and lowland. Talk about buying your neighbor's field; simply deepen your own by the system of ripening a field for a crop before you add more acres, it is cheaper to secure and cheaper to maintain depth and richness of soil on one farm than to buy the second farm and dissipate the energies of men, teams, machinery, seed, time and money over a wide expanse of acres. I tell you again, gentlemen of the Keystone State, it is the acre, with from six to eight tons of hay that solves the question of the market for the farmer who will do it.

You have all heard the instructive scientific lectures on the soil by those professors whom I have already referred to in this meeting, one sounding a note of warning in regard to the small yield of wheat per acre in the United States, the average being only a little over twelve bushels per acre last year, while another with his tables showed the value of manure as it came from the stables to be the greatest, but after it was out of the stable that the carelessness of the farmer allowed it to degenerate into comparative useless stuff. If every farmer here will go home and turn his barn into a factory this fall and coming spring, converting his harvests into finished products, such as butter, milk, eggs, poultry, swine and sheep, while the by-product in the form of manure is returned to the farm, the acre will solve the oft-asked question, does farming pay.

There is a new commodity that is produced on the farm to the great surprise of farmers and their families, and it sells higher, brings a bigger price in the best markets than any crop the farmer grows out of the ground per square inch; and that is cleanliness. It is one of the important articles sold in our cities today and so strong is the demand that people are willing to pay a big price for it. I had that experience myself when I began to make butter and send it to Philadelphia; it was sold along with "the others," but it was not long till there was a call for the butter with "the three small stars," and the market man came back one day and said I have a customer for all your butter. Now and then some one near by the little farm would run short of butter and send over to see whether we would be so kind as to "let mamma have a pound of butter." It was not long afterwards the mother called, then a carriage drove up and asked whether there was a chance to get a pound or two of butter, then came an engagement of twelve pounds a week regular, summer and winter, at better prices from one family alone, and so it went on till city trade was cut down and the market man complained that he did not have enough. About that time a Jersey heifer came in fresh with her first calf and helped up the quota and things ran along prosperously.

The market man came home one day and said the only butter I sold was yours, I wouldn't have sold that had it not been engaged. I asked the reason, he says there is a fellow that comes there and says he only has one cow and will sell over three or four hundred pounds of butter and right nice butter, but he sells it two, three or four cents cheaper and the people just buy from him and I can not afford to sell mine at such a price. Then it came out it was oleomargarine the fellow was selling and made lots of money out of it.

Not long after this a change came over my household: A Committee from the House for the Diseases of the Lungs drove into the little dairy farm and asked whether they could take a sample of the milk. I said certainly. The sample was procured as they directed and went back to the Institution and tested the milk. What they wanted was a milk rich in butter fat; they tested it and reported it to be 5.80, just what they wanted, and offered me 6½ cents a quart for it. The bargain was made and detailed agreement about our having the right to have all buckets, pitchers, ice box and utensils clean about the ice chest where the milk was kept; and if at any time there was anything wrong the milk must be sampled from our cows instead of being in their care. I will say there was never any fault found with the milk in our hands, but when there was any trouble it was through the neglect of the servants at the Home. Many pitchers were sent back to be washed, buckets cleaned, spilled milk in the ice chest wiped up, and a number of things that had to be corrected in the morning before the key of the chest was handed over. It was not long till the doctors of the Home sent for me. I went up and they looked so pleasantly at me that I felt it was not a call-down; so I said to them. "Oh, no we wanted to ask you about the milk; how you kept it so even in quality, flavor and especially how you got it so clean. All the milk we have ever had here before has left so much black sediment in the pitchers that we did not use the milk within an inch of the bottom." I told them that the cows were kept clean, groomed every day, dairy utensils clean, and the milkers washed and put on paperhanger's aprons and used a short towel about 18 inches long for wiping off the udder before beginning to milk. That was back in 1895. Then there was no one about that I knew who exercised such care with getting clean milk. But I did it for two reasons, for I found out to soil the cattle they must be clean and after arranging every thing to keep the cattle as clean as possible, it was still necessary to curry and groom them so as to get more milk, keep them healthy and get clean milk, so that the three benefits grew out of clean cows, clean stables and clean milk.

The reason I have told you all this is not to brag how I got customers to take my milk, but to tell you that I never asked any one to buy a pound of butter, a quart of milk or advertized a cow or calf for sale. I say it simply to show that people are hunting places where they can get what they want. Do you think the little farm had no competition? You all who are sitting here are old enough to know human nature better than that; why, certainly it had. I remember a nearby neighbor, a mile or two away, who came to see me and spent quite a long time asking questions about this and that as well as how we did things and went straight to the Home and offered to deliver milk just as good as mine dare be for 4½ cents a quart. He even went so far as to tell the authorities of the Home that he had been down to see Mr. Detrich's cattle and how he did things and he knew he could please them. The first question they asked him was whether he had thoroughbred Jerseys. He had to say, no. But he thought he had common cows just as good.

Another person took milk there a whole week on trial, left it there, without charge, my man saw the milk sitting in the same ice chest. First day there was a lot of it used, the next day less, and at the end of the week the visiting can was gone. The market wants quality and cleanliness, it will hunt it rather than not get it. These points in my farming I aimed at to get the most feeding qualities into all my crops, hay, corn silage and bedding. There was no manure too good for my soil, no feed too good for my dairy animals, and no milk too good for the market. I fed the best, bred the best and sold the best I possibly could. Farming was a joy to me, and I found it most profitable when I practically did what I have told you in this address, turned my old farm barn into a factory, and was then long, as Wall Street says, both on the acre and the market.

SECRETARY MARTIN: We have time, I believe, for eight or ten minutes of discussion, and then, as previously announced, the photographer will be ready to take the picture of our convention.

MR. SCHWARZ: I understood the speaker to say that you cannot bring up any farm with green manure; am I right?

DR. DETRICH: I am talking to the man with a barn; you have no barn.

MR. PEACHEY: You talked of the cow; I don't agree with you. I sold mine last Saturady. Can I get anything in the place of it that will do for me what that cow has done?

DR. DETRICH: I am giving you my practical experience. I handle catle; if I handled dogs like my friend Schwarz, I would know something about them. My principle is that my barn is a factory which holds the raw material taken from the fields, and is fed to the cattle, they are the operatives, turn it into the finished product for the market; and the by-product, the manure, is taken back to the field, and this manure brings up the farm. I don't believe that there is anything that will take the place of this manure handled but once direct from the stable to field. If you take the manure fresh from the dairy barn and put it on the field, it forms a blanket or a mulch and it is just as necessary to have the ground blanketed in winter as it is to have horses blanketed and milch cows housed; that blanket is a wonderful protector from the winter's wind, and in summer time it is a wonderful umbrella aid to the retention of moisture; some crops are heavy drinkers, like some men—for instance rye is a heavy drinker; watch your soil carefully; don't sacrifice to soil for the crop. You say of a crop "it is very good," but I doubt whether it is so good, because it takes your soil fertility, and it is doubtful then whether another one will grow. You buy fresh manure and spread it on, and leave it exposed to the elements, weather it on the field is the only proper place. I would not plow after August under any conditions. I went down to Flourtown on the fourteenth of this month; that property is neglected now; the last crop was corn, four years ago; but there is not a wash on the hilly part of the little farm; everything is in excellent order as far as the soil is concerned. I walked across it the other day; there was not a weed on the farm when I left; I was perfectly surprised to see the briars that in the four years of neglect grew out into the field and there were none there along the fence when I left.

SECRETARY CRITCHFIELD: I have heard that the proprietor of the Flourtown farm sat in his sulky plow and plowed with gloves on; why then should he have his sleeves rolled up?

DR. DETRICH: It is true that I sat on a reversible sulky plow, and wore gloves, but these same hands which guided the plow, also handled that certified milk and Jersey cows, the hired man and boy, we all wore gloves, then the hands were fit to handle cows and milk them. I was glad when my hired help wore gloves and carried a watch.

MR. HUTCHISON: How would you produce enough manure to enrich a poor farm of two hundred acres? How long would it take you to do it with twenty or thirty cows?

DR. DETRICH: I would not bother with a proposition of that kind. When I started at Flourtown I was as poor as you were, and yet I managed to start till the little farm supported two cows to the acre, and improve the place. Twenty cows and two hundred acres would be a waste of time in my estimation and no business about it.

PROF. AGEE: I have a question which I would like to ask Dr. Detrich. I visited that big farm down in the Chester Valley, and I am sorry he did not continue there two years longer because he would certainly have changed the face of the earth in that locality. But if the green manure will not improve the soil fertility, and if the use of commercial fertilizer is unnecessary, and if there is only one right way, and that is to make a factory to turn the products of the land into animal products, then where would we go for the other mineral carrying material that will serve as fertilizer, and where would we go for all our meat, and all our grain, if the farmers all over the land, or even one-half of them or one-quarter of them, were to engage in farming along the lines laid down by the Doctor, and what would become of all the vegetation? Why, we would have no vegetation, and no fruit. Now, a plan that works must work all around. Now, while the Doctor was speaking I sat here and watched my old friend, Captain McCreary, and I wondered what he had to say regarding this system of farming. Is there no way of fertilizing possible that will leave us vegetation and fruit and meat and grains as well?

DR. DETRICH: I am very glad to answer Mr. Agee's question and I am very sorry that I should have caused any ambiguity in the mind of my friend Agee, for in order to make its message so plain to the general farmer I selected the most potent factor on my farm to illustrate the point so that there would be no possible misunderstanding. I hold that the trucker, the fruit grower, the gardener, the rose grower are all in a different category from the man with a barn on his farm—this whole class of soil workers just named never complain about the soil in the sense which the farmer who has a barn on his farm does.

Mr. Agee certainly does not presume that I am ignorant of the use of legumes, either for feed or green manure? But the legume only fits in as a catch crop and at best it cannot begin to stand comparison with fresh stable manure of the kind made and saved at Flourtown. Inefficiency of either humus or plant life, legumes only work well under certain conditions, while stable manure works well everywhere, depth of plowing one season for a legume is right, and for the same legume the next season is wrong. Legumes work well for orchards; truckers can use them; but for any sane farmer it pays infinitely better to run a legume through a cow than to plow it under green. Mr. Agee must admit this himself. Mr. Agee must admit that legumes are not as practical for the general farmer with a barn on his farm to plow under as they are to feed the animal and let the animal fit the legumes for manure. I say boldly out that a farmer with a barn on his farm is wasting money when he buys commercial fertilizers for his acre instead of feed for his live stock and have them turn the feed into bone, muscle, milk, eggs and fleece, and get the manure besides. I do not think there could be more sound teaching than to encourage the farmer to use animal industry to push the acre and sell the market. Neither green manure will nor bag manure ever be able to stand alongside of solid and liquid stable manure saved and applied to the acre. Commercial fertilizer companies would only be too eager to extoll the merits of them in comparison with stable manure. Where is the humus in commercial fertilizers?

Mr. Agee asks where would we go for our meat and our grain if farmers were to engage in farming on my lines. Why, here is just where the meat is, it is made into choicest steaks and roasts in the barn factory on the farm. I am upholding that very idea of the farmer converting his products grown on the acre into the finished live stock of the best breed. That the cow, steer, hog, sheep and fowl are to grow and grind while they grow, the products of the acre into finished market goods and return the by-product of these animals to the enriching of the acre.

As to the wheat question, I had no trouble to raise 49 bushels of threshed rye to the acre on the Flourtown farm, but I quit it because it did not pay me to raise even a crop of that size, when I could use the straw of that crop for my purposes, plow the stubble from which I took it off and raise 30 tons of ensilage. Yet that same season, and there was neither bag manure nor green manure used to do it, but fresh stable manure taken daily from stable to field.

I claim that the system does work all around. Mr Agee says that it doesn't. Why, the common remark of persons who came to live with me on the Flourtown farm was that they never tasted such succulent vegetables; and apple trees that never bore fruit any year and were said to be too old began to bear every year under my system of manuring. Corn of all kinds was most delicious, well filled and good sized ears and very prolific.

As regards Mr. Agee's turning to Mr. McCreary to ask him whether there is no other system to raise vegetables, fruits, grains and meat as well, I only have to say I tried old style farming one year and went back financially and the acre didn't grow a crop big enough to pay for its keep, but when I turned my barn into a cow and butter factory and took as good care of the manure as I did of the milk, I could find no fault with the acre, for the barn factory started two carts agoing, one with the milk and the other with the manure; when the one went out the front way to the market the other went out the back way to the acre. I will say once more that the barn, when turned into a factory to convert the raw materials of the farm into a finished product is the happiest solution of the whole farm problem for me, when the by-product is returned to the field, until an acre keeps two cows instead of the old style farming of two cows on ten acres.

Mr. Agee understands me to say that fertilizers have no place at all in American farming; he misunderstands me. I believe they have, but it is an inferior and expensive place alongside of stable manure, for most of the general farm crops. I believe it is a mistake to use all stable manure for a crop. All that I claim for the intensive system is, that it can be done with less expense and yield the largest crops and profits and keep up the fertility of the soil for wheat or any other crop a farmer wants to grow.

For my purpose I cut out long growing crops like wheat because I could get double crops to serve me better than one long one. I also cut out hemp and flax, but I grew barley, not to thresh. but for green feed. I generally can understand Mr. Agee, but I must admit that I do not see what he is driving at. Does he still advocate the old dark, dismal storage barn for the farmer when every veterinarian and Board of Health is advocating light and ventilation. Is Mr. Agee going to tell the farmer to let his barn factory stand idle, buy fertilizers and plow under legumes for manure? If this is the attitude of Mr. Agee or any other American farmer on the manure question, my farm practice will not accord with Mr. Agee's teaching. When Lancaster county tobacco growers would see the soil at the dairy farm they would say, wouldn't that grow tobacco? When a trucker would see it, wouldn't that be the soil for cabbages? But the peach grower shook his head, no good, while the rose grower wished for that short cow manure to grow roses. I am afraid our author of farm facts and fancies is a little strangely mixed on this question, for the first time since I have known him.

SECRETARY MARTIN: The discussion is just becoming interesting, and I regret to be compelled to cut it short, but the photographer is waiting outside.

I want to call attention to the afternoon program, which as you will notice, is a very excellent one. Prof. Watts will tell us about "Some Essential Principles in the Practice of Market Gardening"; Dr. Funk is to speak to us on "Fruit Raising in Pennsylvania, Past and Future," and Mr. Wittman is to tell us "Why We Get Poor Hatches, Weak Stock, and Dissappointment Mostly Out of Our Poultry." We will now stand adjourned until half past one o'clock.

Immediately after adjournment the photograph of the convention was taken.

New Castle, Pa., Wednesday Afternoon,
May 27, 1908, 1.30 P. M.

Mr. W. C. Black in the Chair.

SECRETARY MARTIN: Gentlemen, before entering upon the program for this afternoon, I desire to announce the Committee on Resolutions; it is important that in a body of this kind, proper resolutions worthy of the work of this division of the Department, should be provided for; always during the year that has passed, some deaths have occurred of members of the Board or Institute Lecturers, and I wish to say at this time that any representative from any county, in which county there has been a death, either of a member of the Board or Institute Lecturer, will please present a memorial of it to the Resolution Committee, in order that proper record may be made of the same.

We repeat our announcement of the auto ride this afternoon, at about four o'clock, right here from the Court House. We will endeavor to adjourn at that time that we may all enjoy the excursion.

The Committee on Resolutions consists of the following gentlemen: Mr. H. M. Gooderham, Mr. Matthew Rodgers, Mr. M. M. Naginey, Mr. H. W. Northup, Mr. R. L. Schwarz, Mr. L. W. Lighty, and Dr. M. E. Conard. Resolutions will please be presented to this committee.

The CHAIR: The first thing on the program is an address by Prof. R. L. Watts on "Some Essential Principles in the Practice of Market Gardening."

The following paper was then read:

SOME ESSENTIAL PRINCIPLES IN THE PRACTICE OF MARKET GARDENING.

BY PROF. R. L. WATTS, *State College, Pa.*

Mr. Chairman, Ladies and Gentlemen and Institute Workers of Pennsylvania: I am afforded peculiar pleasure in having the opportunity of addressing a meeting of this character, held in the very center of one of the world's finest markets, and upon a subject of greatest commercial importance to the entire state.

With the mere mention of truck farming and the market gardening, we naturally think of Long Island, New Jersey, the Baltimore district, Boston and vicinity, Norfolk and other sections which have established a reputation for extensive and intensive vegetable farming. We think of these districts as being unusually well adapted to the growing of garden crops; of their methods as being the best, and of their gardeners as well advanced in the science and practice of market gardening. But how about our own State? Where does

Pennsylvania rank in the value of garden products? Is there anything in the garden operations? Is there anything in the gardening operation of this State to excite pride? Over $15,000,000 worth of vegetables, including the potato, are produced annually in Pennsylvania. Only one other state, New York, makes a better showing. People have little to say about the gardening operations of Pennsylvania, yet, the State ranks second in the commercial importance of the vegetables produced.

The value of miscellaneous vegetables per acre is higher in Pennsylvania than in most other states. The average value per acre in Ohio in 1899 was $58.64; in New Jersey $66.25; in Michigan $69.17; in New York $73.55, while in Pennsylvania it was $89.32. The greatest value per acre in any one county of the United States is in Middlesex county, Massachusetts, where the average was $164. Philadelphia County, Pennsylvania, takes second rank, the average being $151, and Allegheny County, with an average of $103, ranks fifth. The average value per acre in Queens County, Long Island, was $143; Essex County, Massachusetts, $114; Los Angeles, California, $91; Monmouth County, New Jersey, $68; and Baltimore County, Maryland, $58.

Although some counties have established a reputation for fairly high receipts per acre, the average in all communities is much lower than it should be. The average in Queens County, New York, is $143 per acre, but the most skillful gardeners in this county average a thousand or more dollars per acre. Numerous examples could be given of men whose annual receipts range from $500 to $1000 or more per acre. Mr. M. L. Ruetenik, a gardener of remarkable skill, operating near Cleveland, Ohio, sold $32,000 worth of products in 1906 from 18 acres of land, two acres of which is covered with glass.

A FEW AIMS.

The most successful market gardeners have high and definite aims. They are not satisfied with average results. They strive to secure maximum profits from every plat of ground cultivated. In order to accomplish this, it is necessary to consider the following factors: 1st, yield; 2nd, quality; 3rd, earliness; 4th, marketing and market problems; 5th, principles relating to the business side of market gardening. These factors are not necessarily arranged in order of importance. The character of the vegetable grown, the market to be supplied and other local conditions determine the relative importance of these factors.

I have often observed that truckers who obtain large yields are generally if not always prosperous. Quality need not necessarily be sacrificed for quantity. With vegetables, quality and quantity usually go together. This is not true to the same extent with fruits, for the largest and best producing apples, pears and peaches are often the most inferior. But quality in vegetables is generally secured by rapid growth and quick maturity, and growth cannot be secured without high fertility, and high fertility is conducive to large crops. It is important to secure quality to as great an extent as possible by the selection of proper varieties, and then to supply every condition which will influence yield. A large class of gardeners fail to realize satisfactory profits because yields are too small. The aims of many gardeners are too low so far as yields are concerned. Many potato growers are highly pleased with 150 to 200 bushels of tubers per acre while others average 300 and are striving for 400 or more. These men with high aims are an inspiration and a benediction to all classes of cultivators.

Quality never counted for so much in getting good prices as today. It is not many years since vegetables lacking uniformity in every particular sold for prices that meant profit to the grower. But dealers and consumers everywhere now demand the best, and keen competition crowds much of the inferior produce to the dump heaps before reaching the consumer. By the term quality is meant not only flavor but also appearance which is a most important factor in making satisfactory sales. Attractiveness is gained by desirable size, form, color and uniformity in all these particulars.

Earliness is not always important. Some New Jersey gardeners find mid-summer or even late vegetables to be the most profitable. It is generally less expensive to grow vegetables late in the season, especially those that require starting under glass in order to reach the market early. But when there is an attempt to secure earliness, there should be no neglect of any matter that will hasten maturity.

A great deal of produce commands low prices because of improper grading, packing and marketing. Then again, good business methods are not always employed in the selling of produce. All of these questions are important factors and will be discussed later.

ESSENTIAL PRINCIPLES.

Men who fail to get satisfactory results in market gardening seldom possess a proper knowledge of the underlying principles. Without this knowledge it is impossible to operate with any assurance of success. Without a knowledge of principles, the business is a source of constant worry because the cultivator does not know whether he is doing the right thing at the right time and in the right way. With a thorough knowledge of the fundamental principles, the gardener is reasonably certain of success, provided he is a good business man and possesses executive ability.

THE SEED QUESTION.

Producers of all kinds of farm crops are just beginning to realize the full importance of using high grade seeds. Earliness, yield and quality are largely dependent upon the character of the seed used. Authough a few gardeners know the value of superior seeds, the majority of them have not given the question careful and intelligent consideration. If the seed germinates properly they are usually satisfied, and with many growers, the vitality or viability of the seed is practically the only factor considered, while this is only one of several important elements that enter into the question of seed selection.

The seed itself may possess high germinating qualities and yet give very unsatisfactory results so far as the matured crop is concerned. Good seed means much more than a high percentage of germination. With proper care of the plantation, good seed will produce a crop satisfactory in every particular. The resultant crop will not be satisfactory unless the variety is true to name, and the best results will not be procured unless the variety represents a well bred strain. There is often more difference between strains of the same variety than between varieties of the same vegetable. It is obvious to all intelligent cultivators that the use of high bred vegetable seeds is just as important as the breeding and raising of high grade farm animals.

High class vegetable seeds may be secured in three ways, viz: From reliable dealers or seedmen, from special growers of select seeds and from selections made at home. Each method has distinct merits.

When seeds are purchased from dealers it is generally safest to buy from the introducers. Nearly every large firm exercises special care in the breeding of certain varieties of vegetables that they have introduced. They pride themselves upon the merits of these varieties and special efforts are made to maintain or to intensify the qualities which make them valuable. It is natural for seedmen to take the most interest in varieties of special merit which they have introduced. Although this general principle holds, some firms have greater reputations than others for the distribution of high grade seeds of all classes. It is not uncommon to find a trucker or market gardener who attributes much of his success to the selection and saving of seeds from his own crops. Such men often create, unintentionally, a demand for their seed. There can be no objection to the use of seed from these specialists if proper care and intelligence have been exercised in selecting, harvesting, curing and storing.

The home production of vegetable seeds is not a desirable practice with all classes of cultivators. In fact, the desirability of the practice depends almost entirely upon the skill of the grower and the adaptability of soil and climate conditions. The average gardener would find it extremely difficult to produce his own celery and cauliflower seed, while it is comparatively simple to procure from the home plantations the very finest seed of tomatoes, cucumbers, sweet corn, peppers and many other vegetables.

In the selection of seeds it is important to note the vigor of the plants and their power to resist diseases. Then seed should be taken from the most productive plants. Uniformity in size, flavor, color and form of the fruits or products should be given the closest attention. There is no reason why a careful, observing, thoughtful gardener should not produce seed of the highest quality and be able to improve the strains from year to year.

STABLE MANURES.

I have been very much interested in recent years as to the views held by market gardeners regarding the value of stable manure for crop production. A great many men on Long Island and quite a large class in New Jersey seem to think that stable manure is indispensible, while a much smaller class of gardeners practice green manuring to such an extent that stable manures occupy a small place in the treatment of their soils. The great fundamental principle in the handling of all soils devoted to the production of vegetables is to maintain the supply of vegetable matter. Much of the manure brought from the cities is very deficient in actual plant food and the manure is valuable more because it adds humus to the soil than to its content of actual plant food. Manure is costing some Pennsylvania truckers from two to three dollars per ton spread in the field and there is no objection to the payment of these prices if the grower can make a profit on such costly applications of plant food. To do this it is necessary to intensify in every possible way. More than ordinary ability is required to make a profit on manure at three dollars per ton.

GREEN MANURES.

I have learned some valuable lessons in New Jersey relative to the use of green crops for manurial purposes. The soil and climatic conditions of the state are generally well adapted to the growing of those green crops which are worth the most for manurial purposes, such as cow peas and crimson clover. Many New Jersey truckers are taking the advantage of this fact and spending less money than formerly for stable manure shipped from the city. This indicates progress and it is hoped that green manuring in Pennsylvania will become more and more popular with producers of vegetables.

A little personal experience in the use of green crops in the restoration of soil fertility for gardening purposes may be of some interest to you. Some years ago I performed an experiment which was the beginning of systematic green manuring on my farms. I selected an impoverished plat of land that contained two and one-third acres. The ground was plowed in August, harrowed, a fine seed bed prepared and rye sown in September, using seed and fertilizer rather freely. The rye which made a fair growth was plowed under the following spring when about two feet high and oats and Canada field peas sown. When the oats were shooting into head in August this crop and the field peas were plowed down and rye sown again in September. The next spring the rye was plowed under and the ground planted in Danish Ballhead cabbage. This course of green manuring consisted of three crops plowed under consecutively without an intervening cash crop. The physical character of the soil was completely changed. A dead soil had been brought back to life by the addition of vegetable matter. The soil was made inhabitable again both to plants and to bacteria. It is true that this course of green manuring cost some money. Soils cannot be built up by the use of manure or green crops without considerable outlay of capital. The soil will not produce its owner a profitable crop unless in a fertile condition and too many truckers are trying to make big profits on poor soils. This cannot be done. The course of green manuring which has been described cost about $75 for the two and one-third acres, including interest on the land and all outlay for labor, seed, fertilizer, etc. Did the experiment pay? This plat of ground which was previously too poor for profitable gardening produced one of the best crops of cabbage I have ever grown that sold for $655.

Many farmers hesitate to plow under heavy green crops because of the danger of souring the land. To prevent this trouble it is desirable to use some lime, harrowing it into the soil thoroughly after plowing. If the furrows are thrown on edge rather than flat the capillary movement of the soil water will be interfered with to less extent and there will not be so much danger of the soil souring. The land should also be rolled or compacted soon after plowing. A heavy plank drag will do this work almost if not quite as well as a roller and will pulverize the soil to a much greater extent.

One of the finest examples that can be cited showing the splendid results from the use of green manures is on the farm of Horace Roberts, President of the New Jersey Horticultural Society. Mr. Roberts grows about five hundred acres of vegetables annually but no stable manure is used except that produced on the farms. His soils improves from year to year and this improvement can be attributed only to the use of green manures. Dwarf garden peas are grown to a very large extent on the Roberts farms between fruit trees and vegetables as sweet corn, cabbage, tomatoes, cucumbers, watermelons and musk melons. The peas are harvested and the vines plowed into the soil. Cover crops are invariably started in the fall which not only help to increase the supply of humus in the soil, but also serve to reduce the loss of soluble nitrates by leaching.

COMMERCIAL FERTILIZERS.

Truckers who use green manures to the exclusion of stable manures generally find it profitable to employ commercial fertilizers more freely. The plant food contained in green manures does not become available so quickly as that of stable manures. It is ordinarily less expensive, however, and certainly less troublesome to buy plant food in the condensed forms of commercial fertilizer. When fertilizers are purchased the best forms should be procured at the least cost and combined in such a manner as to be the most valuable for the crops to be grown. In order to have entire control of all problems connected with the preparation and use of fertilizers, home mixing is advocated and practiced to a considerable extent. The advantages of home mixing are well known by many Pennsylvania gardeners.

THE VALUE OF GREENHOUSES.

If there is any one thing needed more than another among the market gardeners of Pennsylvania, it is more greenhouses. Too many men are depending upon hotbeds for all work requiring glass when greenhouses would serve their purposes to much greater advantage. Hotbeds are not economical neither are they convenient to operate. So far as uniform results are concerned all points are in favor of greenhouses. Ventilation, temperature and moisture are much better controlled in greenhouses and a properly constructed and heated greenhouse is a source of pleasure to the farmer's family during the winter time when farm life is not so attractive as at other seasons of the year. It is not difficult to make the greenhouse pay a profit by forcing crops before it is time to sow seeds for the early vegetable plants to be planted in the open ground.

MARKET PROBLEMS.

A great many men succeed admirably in the production of fine vegetables, but do not realize a profit because of failure to market the produce in the right condition and in the right packages. The first essential is rigid grading or sorting. One inferior specimen in the package may repel buyers or result in an abnormally low price. Every specimen strictly first class in size, shape, color and soundness will go far towards getting the best price. The second essential is the right kind of a package. Most packages are too large. They are too large because produce carries to market better in small packages, and small packages are attractive and popular with the consumers because they may be carried home with very little inconvenience. A day or two spent at the retail stores of our cities should convince the most skeptical of the merits of the small package. The right kind of a package embraces the idea of using a clean package. Soiled and discolored baskets and crates are always repulsive to buyers all along the line of middle men as well as the consumers. Vegetables to sell well must look well. This is the great fundamental principle which should be kept in mind by the packer. It is absolutely necessary to give the vegetables an attractive appearance. Catch the eye and the bargain is more than half made. Skillful and intelligent marketing is unquestionably the most important item in securing maximum profits.

A Member: I would like to ask where Mr. Horace Roberts' place is?

PROFESSOR WATTS: At Moorestown, New Jersey, about eleven miles from Philadelphia, on the Pennsylvania railroad.

MR. SCHWARZ: I should like to hear a joint debate between Prof. Watts and Dr. Detrich on the subject of green manure.

A Member: Regarding the cabbage worm, and the worm that attacks the cauliflower plant, can anything be done?

PROFESSOR WATTS: The green cabbage worm can be sprayed with some poison, like Paris green or arsenic; fresh insect powder or slug shot is most excellent. So far as the larvae is concerned, a different method should be employed. We prevent it by covering the plants with cheese-cloth, and in that way prevent the larvae from starting. Another plan very largely recommended is to cut out a little piece of paper in the center, and slip it over the plant at the time of planting, to prevent the maggots from working down. I think that a very excellent plan myself.

MR. SCHWARZ: After the maggots has started, what do you do?

PROFESSOR WATTS: Use carbolic acid.

MR. SCHWARZ: Muriate of Potash disolved in water, is also very excellent.

DR. DETRICH: I was very glad to hear Prof. Watts say what he did about green manure, because I know what green manure will do; the only thing is that it takes time to bring about results, while with the animal you do not lose time, but feed the animal and the soil at the same time. Of course, you can do it with legumes, but it takes time, while with the other system there is practically no mistake to be made.

MR. SEEDS: If the Professor loses a year in producing, how is he going to feed his cow when he gets it?

DR. DETRICH: If he feeds it when it comes to a head, it is actually the same thing as clover. The advantage of the dairy system is that you have the value of the milk as well as the advantage to the soil.

MR. NAGINEY: I have some experience in gardening, and I find we are troubled with fishing worms; what is the remedy?

PROFESSOR WATTS: I have no trouble with them; if I find any, I simply go down town and bring up a couple of boys to dig for fish bait; that usually settles it. I think if you keep the land thoroughly cultivated and use green manure, you will not have much trouble in that line.

MR. STOUT: The soil infested by these worms is usually the richest kind. If I find them, I take it in preference to any other kind of soil for vegetable gardening.

PROFESSOR WATTS: I recognize the value of the points presented by Dr. Detrich, and I think for men engaged in raising general farm crops it is the thing to raise the legumes for the purpose of plowing them under, but I do not think it is the thing for us, simply we get so much more out of the soil than we take into the barn and feed to the cattle. To us it is selling a high-priced article at a low price.

MR. BOND: Is it not a fact that while we see the advantages of the system advocated by the Doctor, if we all proceeded on the same principle, we would not have a balance ration? If we were to apply only barnyard manure continually we would have only one-sided ration for the soil.

DR. DETRICH: Barnyard manure, before it is washed down by the rain, and boiled down by the sun, contains the fertilizing elements necessary to the soil. I am talking of taking it direct from the dairy-barn and applying it to the soil. I was not speaking of raising corn and crops; I was talking from the stand-point of a man whose barn is a factory.

A Member: I have found salting the ground an excellent remedy for fish worms.

SECRETARY MARTIN: I am sorry that Dr. Funk has been unable to be here, and we have not received his manuscript. I see with us a number of persons, from whom we should be glad to have a few words at this time. I see two representatives of "The National Stockman and Farmer," who also represent the Pennsylvania Livestock Breeders' Association—Mr. Harman and Mr. Bayard. I would like to hear from these gentlemen before we take up the last number on the program this afternoon. Is Mr. Harman present? The audience would like to look at your manly presence this afternoon.

MR. HARMAN: Mr. Chairman, everybody in the room offered to hold my hat; I wish somebody would offer to hold me. I do not believe I am at all right in taking up one minute of your valuable time; I don't know anything to instruct you; I came here to be instructed, so that I can tell you next week in our valuable paper, and you will be surprised at it. It is the greatest scheme in the world, this running an agricultural paper. If you don't believe it, gather up a hundred dollars and start one, and you will have more fun than you have had in your life. If don't take more than fifty or a hundred dollars; the rest is clear.

I appreciate this opportunity to show my face; I think it is all that I should do; you have seen it, so I think I had better retire before I make a fool of myself. I made an effort to get here, even if I did get here a little late. I have been going to these meetings for twenty-five years; it is a long time; not a man of you who is here today, was here at that time. Most of you were not born at that time—I know the ladies were not. I went to report at that time—I did some work at that time, but I have quit. I thought I had a big week on hand, and I had. I am speaking of this to show you the difference between meetings then and today. I am not criticizing, because they did the best they could. I remember that I head-lined the report of that meeting "The Opening of a Chestnut Burr," and I heard from it a great many times afterwards. In criticizing that time, I might say that the "Stockman" was by no means the largest magazine in the world at that time. The improvement in agriculture is a striking example of the progress we are making in this country.

SECRETARY MARTIN: We have also with us a representative from "The Farmers' Friend," Mr. R. H. Thomas, a member of the State Board of Agriculture. Mr. Thomas, we shall be pleased to hear a few words from you.

MR. THOMAS: I made my little speech yesterday on the railroad question. Of course, I am very glad to be at these meetings. I used to attend the meetings of the State Board of Agriculture years ago, when they were much smaller than they are now, and not so interesting as they are today. I am glad to see the improvement along these lines, and am glad to enjoy them with you, and hope to be able to do so in the future.

SECRETARY MARTIN: There is with us another representative of the "Stockman and Farmer," and also Secretary of the Pennsylvania Live Stock Breeders' Association, Mr. Bayard. We would like to hear from him.

MR. BAYARD: I would like to make a speech, but Harman never allows me to follow him. I could never go back to Pittsburg if I made a speech here now.

The CHAIR: There is another young man right behind there, from whom I would like to hear a few words, Mr. McCoy of Mercer county.

SECRETARY MARTIN: We shall be pleased to hear from Mr. McCoy.

MR. McCOY: I have nothing to say except to state that I am glad to be here this afternoon and meet with you.

SECRETARY MARTIN: Will the audience call for any one they would like for a few minutes.

Mr. Agee was called for.

MR. AGEE: I am glad to have a few minutes to talk to my old fellow-workers in Pennsylvania Institutes. I wish that each one of you could be transferred bodily for a few days up to State College to see the school of agriculture that interests me so much at this time. You should see the improvement that has been made in the School in the past five years. It will increase the earning power of many farm boys, and we are striving to do still better things. I believe this with all my heart, or I would not be there. Gentlemen, we have three hundred thousand dollars invested in buildings, dedicated by the Governor last September; we have added twenty practical scientists to the faculty, and now it is up to you gentlemen to tell the people of this change in the School of Agriculture. It is no criticism of the past; we had no money; we had no buildings; we could not bring these scientists in. Now, we have them—practical fellows—and we want our young men to come there and study agriculture. We had ninety last year who came for the twelve weeks courses, and went back home full of enthusiasm, ready to tell others of the work we are doing there. I want to reach the young men of the State, and I want to claim from you a few minutes at every institute to say that Pennsylvania has a practical School of Agriculture, to which the boys of the farm should come by thousands. They have come to us by hundreds; we had enrolled over two hundred our very first year. They will enroll, and the school will grow; let us urge the Legislature to give us more buildings to take care of them. Is there time for an alumnus of the college to say a few words?

A Member: Is there any way for a young man to get this course free of cost?

MR. AGEE: No. Seventy-five dollars will pay for the whole twelve weeks. There are some scholarships for men taking the longer courses.

SECRETARY MARTIN: We shall be pleased to hear from the State College boy.

PROFESSOR WATTS: I believe that the only way to bring the college before our people is by practical efforts on the part of every one of us. In Western Pennsylvania some time ago a young man came to me and said "What do you know about State College?" I said "I went there a few years ago; and I don't think you can go to a better college." As the result of that conversation, that young man went to our School of Agriculture. I suppose most of you men here are Institute workers. I want you at every institute to bring before the people the School of Agriculture, and tell them what we are doing for the boys and girls of the farm. I believe that only by personal work can we get that school where we want it; it is your college and my college, and if it is your college, you want to do all in your power to further its interests. We not only give the boys there a theoretical education, but we give them practical work, so that when they go home they can at once apply it. I speak of the plant department, because I am most familiar with that. Two afternoons every week are actually employed in the propagation of plants, in actual buddings and making cuttings, just as you actually do on the farm. We want every man to say a word for State College.

The CHAIR: We will now take up the next subject on the program—"Why we get poor Hatches, Weak Stock and Disappointment Mostly out of Our Poultry" by Mr. W. Theo. Wittman.

The address is as follows:

WHY WE GET POOR HATCHES, WEAK STOCK AND DISAPPOINTMENT MOSTLY OUT OF OUR POULTRY.

BY W. THEO. WITTMAN, *Allentown, Pa.*

Being the last on the program for the afternoon and suspecting that some of you are beginning to think of leaving, I am going to cut my address very short, and to this end I am going to drop the first two-thirds of my subject, and devote myself to the latter third on "Why we get disappointment mostly out of our poultry." And there is so much to this, I could if I would, make of it a very lengthy topic.

Off hand, the reason people get mostly disappointment out of their poultry, is because of the spirit in which they think on the subject. A good many people seem to think that there cannot be much to learn concerning the poultry business; are unwilling to learn, or, it seems to me, they are most unwilling of all to use common sense as applied to this business.

On our farms today, we are weeding out unprofitable stock in practically every line except in our poultry. As to our poultry, we usually know nothing about it and seem to care less. This State produces yearly several million dollars worth of poultry and eggs, and if it would produce several added millions yearly, by correct methods of poultry keeping, said millions might practically be all profit and mostly go to our farmers. I am in dead earnest about this.

And first, I want you to get better poultry. Get rid of your mixed dung hills of all colors, ages and sizes and get pure-breds. Get one variety of one color and have nothing else. You will think more of your farm, more of your poultry and have at least an equal chance of coming out even. I say an equal chance, for most pure-breds the farmers are buying are little better than dunghills.

You say how is that? Well first and foremost, you are not paying enough, and secondly you are not as a rule buying from the right people. I can best illustrate what I mean by this, by telling what I find in the advertising columns of one of your leading farm papers, this months issue. There were some twenty advertisers of poultry, one asking over $1.50 per sitting for eggs. The bulk asked 75 cents to $1.00 per sitting and most of them advertise as having from ten to fifty varieties.

Now it happens that I know the yards and the poultry stocks of quite a number of these advertisers, enough of them at least to gauge all of them of their class. And let me tell you in all sincerity that I would not use the eggs from these parties as a gift. No, I would not want to set them, and I would not want to eat them even.

Why? Well, these fifty varieties and none right, the fellows I am speaking of, started with dead cheap stock. They have them crowded in small bare yards and illy ventilated houses, until they have sapped all the vigor, vitality and strength out of them. And today you can find among them birds sick with tubercular troubles, liver sick, roupy, one eyed colds and the whole catalogue of ills poultry is heir to. No, sir, such pure-pred stock is of no account to the farmer. And when the farmer buys the so called utility stock of the small chicken fancier, he is getting little better, for he is getting birds the other fellow simply wants to get rid of. Would get rid of by sending to market if he could not push off these scourings as cheap utility birds.

Now the hens on our average farms, may perhaps lay 50 eggs per year per hen. On the other hand there are men in the poultry business, at egg farming, who have large flocks of hens that run near to 200 eggs per year per hen. Think of your 50 egg hen and then of the 200 egg hen of these men by comparison. Can you figure the difference between the profit of a hen that just lays (mostly does not lay) and one that is bred to lay. And don't you think if you wanted to buy better poultry you would be pretty safe in buying said poultry from a man whose bread and butter depends upon his poultry being the right sort?

I place as the first essential, that our farmers have better poultry and have it the quicker the better. Have pure bred poultry of the sort they should have.

Next comes housing. And I will have to cut this very short. But those of you who have heard me before, know how strongly I am prejudiced in favor of more sensible poultry buildings, more rationally located on our farms. Of how strongly I favor the fresh air type of poultry building, with its clean board floor and foot of litter as a feed bed. With sunshine, light and air flooding it, and of how I am dead against the poultry having access to your manure piles and pig pens.

Now, see here:—While we are on the subject of housing, I suppose everyone in front of me owns a poultry house? Have you removed the sashes yet? If you have not, some of you at least, deserve attention from the society with the long name.

How can you be so foolish, so cruel. Take them out. Give your poultry a chance to live. Perhaps you cannot take them out without producing a draft over the roosts. If your chicken house is of that kind, take down your chicken house. Its no good—if you are in earnest about having your share of the rich profits coming out of the poultry business.

If you want more eggs this summer, want less hens to die, want earlier moulted hens going into winter in the best possible laying condition, keep them out of that sweat box hen house of yours this summer. And if you will not take out those sashes the first thing after you get back, then I want you to raise your hand now, and I will ask you to stay in after this session for further effort on my part with you along this line.

Now, third and last, feed. You can have the proper machinery and the proper buildings, but you cannot run without the proper oil and fuel, properly fed, and there you have the chicken business. Show me a good feeder—I use the word "good" in its broadest sense, and I will show you a man who is making good with his poultry. A hen to be happy, and to be happy and to be profitable are synonymous here, wants to be busy all day long and wants to get her food bit by bit and wants a variety of food. This means yards so large that you have practically free range—yes, I believe it desirable on most farms to yard the poultry—yards with a heavy sod and some shade. Here is pretty nearly half your feed in the summer time, etc., etc.

PROFESSOR MENGES: Why do we get such poor hatches? I did not catch that.

MR. WITTMAN: Sometimes the incubator is wrong; sometimes the chick is wrong, but we can help the chicks by giving them plenty of good food, sunlight and air. That is what they need.

A Member: What is the best chicken for the farmer for general purposes?

MR. WITTMAN: That depends on the individual taste; if I liked the White Leghorn, I would take it; or if I liked the Rhode Island Reds I would take them. The Rhode Island Reds is a new breed, but it is a good breed, bred from the dung hills in the State of Rhode Island.

MR. SCHWARZ: Is the Buckeye better than the Rhode Island Red?

MR. WITTMAN: I don't take much stock in it; it is a woman's chicken, originated by a woman.

MR. WITTMAN: Can you tell us the parties from whom to buy our stock?

MR. WITTMAN: I could not do that here; if you come to my house, I will tell you. In the last ten years the business has grown up so high that we do not have enough stock to supply the demand.

MR. COWAN: I am not much interested in the hen question, except that when I came home from Allentown last summer, I told my neighbors who were interested in chickens, and gave them the address of a party at Allentown; they sent there and paid a high price for the eggs, and the eggs did not make good. They were Brown Leghorns.

MR. WITTMAN: I am not speaking of fancy chickens; entirely of utility breeds.

SECRETARY MARTIN: Is there such a thing as breeding for the laying qualities.

MR. WITTMAN: Oh, yes, there is; I am not enough of an artist to go into the question, but if you will take a White Wyandotte, that is a good layer, and then take her son, and breed him back to his mother, you will have about three-quarters of the blood of the mother, and if you go this way for five years, years you will have a chicken that looks like a Leghorn.

MR. HUTCHISON: You spoke about agricultural papers advertising a cheap rate for eggs?

MR. WITTMAN: No; the paper is getting a good rate for its advertising.

MR. HUTCHISON: Now, my wife sent to Ohio and paid a dollar a setting for Plymouth Rocks, and they were all right. I don't like to hear you condemn these moderate priced eggs.

MR. WITTMAN: You can get good eggs for a dollar, or you can get them for nothing, if you have good friends. But a man offers to sell you eggs for as low as eight dollars you may be sure they are eggs that he cannot use himself. Good eggs are high priced, but it pays to get them.

MR. GOODERHAM: I would like to know how Brother Hutchison knows they are Plymouth Rocks.

MR. WITTMAN: I know; because the man who sold them said so.

MR. HUTCHISON: Because my wife who keeps the chickens says so, and I never doubt her word. She knows as much about farming as I do.

MR. COWAN: I would like to ask the speaker whether he keeps fancy eggs and utility eggs.

MR. WITTMAN: For about ten years I was a utility man, but if a utility man has to sell twenty-two eggs for five dollars when a fancy breeder can sell a dozen for a hundred and forty-four dollars, can you blame him for becoming a fancier?

MR. COWAN: I got for my friend what were supposed to be the best in the city.

MR. WITTMAN: The first chicken I ever sold for a hundred dollars was the worst bargain I ever made; I could have sold it six months later for double that sum, and I offered it to get it back, but I could not. It was the dumbest thing I ever did in my life; you can't get around that.

MR. COWAN: I don't know whether the party I speak of paid you a hundred dollars or not; at any rate, it was too much for the results.

MR. WITTMAN: We are drifting away from the subject. The trouble is with most farmers that they get a few pure bred chickens and mix them up with the dung hills and then expect the results of pure bred stock.

A Member: What is the remedy for gapes in chicks?

MR. WITTMAN: I feed little chickens very often, but I don't feed them for the first two or three days. It absorbs the whole yolk of the egg; too early feeding is one of the reasons they have diarrhea; give them water, and they will live a week, and then you can begin to feed them, and they will still do fine. Don't feed them too soon; give them water, and then you can begin to feed them, and feed them well and feed them for all they are worth.

MR. KESTER: Would you feed them corn?

MR. WITTMAN: No; I don't believe in giving them much hard food. They do not need very much in the beginning—wheat, hulled oats or something of that kind. In that way you will have rich red blood to build on, but you cannot do it with corn.

I am sorry for the fellows who have the gapes. Nearly every one has his own gape remedy; some use the Gape Worm Extractor; that is better than most remedies; but you have to get back at the cause of the gapes. I would move the chicks until I found some spot that had not been contaminated.

A Member: But what remedies can you use?

MR. WITTMAN: You can use a cathartic, or you can feed garlic, or use camphor or turpentine, but you are apt to taint the flesh of the chicken so that it becomes obnoxious. The best way probably is to have no little chicks for two or three years until the infection has died out.

MR. SCHWARZ: What is the best time to start chicks for winter breeding?

MR. WITTMAN: Depends upon the breed.

MR. BRODHEAD: If the chicks and the coops are kept clean, there is not much danger of the gapes, is there?

MR. WITTMAN: No; not much danger, but if the ground once becomes contaminated there is a source of infection. Take salt and use that for the angle worms, and lime the ground and put two inches of clean, sharp sand on top of that.

MR. BRODHEAD: Is there not a prepared Little Chick Feed on the market?

MR. WITTMAN: Nothing better than that, except that there are some brands on the market which are largely cracked corn; I would not pay any poultry house $2.50 for cracked corn.

PROFESSOR MENGES: Why don't you tell them how to prepare their own feeds?

MR. WITTMAN: They can't make it as cheap as these poultry houses can prepare it. They can buy the wheat, oats, kaffir corn, etc., so much cheaper, in large quantities that I think you can buy this feed at $1.60 f. o. b., St. Louis.

PROFESSOR MENGES: But suppose you tell us what is the best thing to feed young chicks?

MR. WITTMAN: For very small chicks you don't have the facilities to prepare cracked corn, so I would not feed them much of that; when they get to be four weeks old, you can feed them a little, with about one-third hulled oats.

A Member: What about mash?

MR. WITTMAN: Oats and barley and middlings are good.

MR. HUTCHISON: What about the cheaper feeds—wheat (weed) seeds and cotton seed?

MR. WITTMAN: Yes, they include these, I am sorry to say.

A Member: Weed seeds have food value, have they not?

MR. WITTMAN: The chickens practically clean them up. An incubator man came to see me, and he got a new one on me; I exercise the chicks, but he told me that if I exercised the eggs as well, I would get a better hatch.

Now, I am going to quit right away. I did not know you were interested in chickens so much; I thank you for your attention.

SECRETARY MARTIN: Now, my friends, we have just a few minutes; I am sorry we have no more, but I am going to call on Dr. Hunt to talk to us for these few minutes on raising alfalfa. I know he will be kind enough to give us a talk of a few minutes on this important subject.

DR. HUNT: Mr. Chairman, Ladies and Gentlemen: I had not the slightest idea of talking to you at this time. If you want to know anything about alfalfa, the best way is to ask questions. So as to get you started asking questions, I will say that there are some half a dozen conditions necessary to the raising of alfalfa successfully in humid sections. The first is soil; another is climate; another is the seed; another is the preparation of the soil, including the addition of lime and fertilizers. Another essential factor to successful growing is the inoculation of the soil; another essential factor is the time of sowing; another is the treatment of that crop after it has been sown. If I were to talk about this subject, gentlemen, I would keep you here until supper time. Now, if there are any questions, I will try to answer them.

SECRETARY MARTIN. How do you prepare for seeding?

DR. HUNT: Suppose you have a soil suited to alfalfa, (and if you send us a sample of your soil, we can examine it and see whether it is a soil that will raise alfalfa easily) there are three things that I would advise every person here to do; I would like to say that two of them are not enough, but that it is necessary to do the all three things. The first is, to manure the land with stable manure. If you manured it last year, forget about it. Manure it again when you are getting ready to sow alfalfa, say about two weeks before you seed it, from ten to twenty loads of manure. Next lime the land with from a thousand to three thousand pounds of lime; and third, apply from one hundred to four hundred pounds of soil to the acre, from some soil already inoculated. Now, can I impress on you that you can do two things, you can inoculate and manure it, or you can inoculate and lime it, or you can lime and manure it—and fail, or you can do the three things, and then sometimes fail, but unless you do the three things, you will be sure to fail.

A Member: Must you do these three things?

DR. HUNT: On certain soil, certainly. Of some soils you don't have to, but on the average soil it is absolutely necessary. We tried it experimentally, taking every combination of two of the three essential things, and we failed every time, and we even did all three things, in some cases without success.

A Member: Would a liberal application of wood ashes do?

DR. HUNT: It would do no harm, but do the other three things, too.

MR. GOODERHAM: My soil lies at an elevation of 2,000 feet. Some tell us to sow it in August. Would you say that is the best time?

DR. HUNT: I believe that the two worst months for Pennsylvania are June and July. The best month in Pennsylvania for spring seeding is the latter part of April and part of August. We put in a fall crop last year on the 17th of August, ten days too late, in my judgment. Now, a word about spring seeding. Remember that alfalfa is a warm weather plant, and no man will succeed in raising alfalfa who does not realize that the plant is different from red clover. For twenty years I preached the doctrine that alfalfa could not be grown successfully where red clover could be grown. I was wrong because I was all the time trying to grow it by the same methods that red clover is grown. One of the essentials of red clover is to get it sown early. That is what you don't want to do with alfalfa. You want to let the ground get warm. The best advice I can give you as to time is, that the best oat sowing time is too early, and the best corn planting time is too late; it lies somewhere between the two.

MR. KESTER: Could you plow down the clover seed and sow it with alfalfa?

DR. HUNT: I prefer a cultivated crop preceding alfalfa. Probably the best advice to give to the average man, is to advise him to sow in the spring, and to have his land ready by having a cultivated crop in it the previous year—for example, a corn crop.

A Member: You advise putting on from a hundred to four hundred pounds to the acre of inoculated soil; should this be harrowed or cultivated in?

DR. HUNT: First manure and plow the land, say two weeks before sowing. Then about a week before sowing lime it, harrow the lime in. Just before sowing harrow again to spread the lime thoroughly. They apply the inoculated soil and harrow at once. Do not allow the inoculated soil to stand in the sun; keep it in bags in the shade. Just as soon as it is applied harrow to cover it. These organisms are very easily killed by heat, and by drying.

MR. SEEDS: Does this inoculation have anything to do with the nodules on the roots?

DR. HUNT: Yes; nodules will occur on the roots in, say six to ten days after the plant is started, if proper organisms are present.

A Member: Where do you get pure seed? Some of our neighbors got some, and got dodder with it.

DR. HUNT: I don't know of any way that will guarantee you against a man selling you seed with dodder in it. The best way is to go to your seedsman and demand a sample of alfalfa seed, and then test it to see that it is free from dodder, and get him to guarantee to furnish you alfalfa seed according to the sample. It is easy enough for any one to find dodder in alfalfa. If you will send a sample to the Experiment Station at State College we will tell you whether it has dodder in it, or not.

MR. BLACK: Mr. McCoy sowed ten acres in Mercer county in July, and he has a very good catch; I know another sow in June that is very good. Mr. McCoy, please tell us about the time.

MR. McCOY: It was in corn the year before, and we plowed it and worked it, and on the 8th of July we manured the soil and limed it, and then we sowed about four bushels to the acre. We sowed it on the 8th of July, and we mowed it twice last fall, and we have ten acres of the nicest alfalfa any man would want to look at. Where the lime had not been put on before, you can tell to the spot where the lime was put on; it is like falling off a precipice.

SECRETARY MARTIN: I want to say that the automobiles are in front of the building. We can take about thirty people on one trip; please fill up the cars, and give this number for the excursion, when they return those remaining will go; we want all to take the trip and see the surrounding country, and then come back for the evening session, which will open at half past seven. We have a very interesting program, and I hope none of you will miss it. We now stand adjourned until this evening at seven thirty.

New Castle, Pa., Wednesday Evening, May 27, 1908, 7.30 P. M.

Mr. A. L. McKibben in the Chair.

SECRETARY MARTIN: The Chairman of the Resolution Committee would like to say a word before we take up the evening's program.

MR. GOODERHAM: The gentlemen whose names have been mentioned as being members of the Resolution Committee will kindly meet me in the room that has been set apart for our convenience tomorrow morning at eight o'clock.

The CHAIRMAN: We will now take up the exercises proper; the first speaker will be Mrs. Sara Walrath Lyons, of New York City, who will speak to us on "Foods and Dietetic Values."

The address is as follows:

FOODS AND DIETETIC VALUES.

BY MRS. SARA WALRATH LYONS, *New York City.*

"Foods and Dietetic Values"—our good Chairman stumbled over the word "dietetic," which simply shows that we are unfamiliar with the word, which is of such great value. We have been taught diet in schools, but when we come to consider diet values, we find we knew nothing until the last few years. Why has it become necessary in the last few years? Simply because of changed conditions that have arisen which make necessary the study of all conditions relating to health. We have many and various ailments of the body today, owing, I fully believe to the many and various articles we consume, which we miscall "food," because what we call "food" are applied to the plant element of life just the same as the soil food is to the plant life. Now, we give a great deal of thought and attention to giving the plant the food it needs, that it may grow and develop in a wonderful way, and be very productive. We study the growth of the plant life and of the soil from an economic standpoint; that is, we want to get the utmost possible from the plant life in order that we may increase our profits from the farm. That is right, so far as it goes, but we also want to study the human body, and want to understand it, and learn how to get the most from it. How can we expect to be physically sound —how can we expect to get full results, if we do not have a well-nourished body? We find that where a body is not well-nourished, there is not only physical weakness, but there are abnormal tendencies. We should see carefully to the diet of the child, so that it may have a well-nourished body, and especially up to the age of ten years, look very carefully into the diet, to see that the child gets the necessary nourishment to develop physically, and at the same time mentally and morally. If we will do this with every child that goes to school, we will soon find very different conditions from a physical standpoint, and from an economic standpoint, as well.

Millions of dollars have been expended in the study of everything that pertains to the soil life, and the food of live stock, in order to secure the best returns, but not one cent has been expended for that greatest necessity of all—the human health. There has been no college or school where one can obtain a knowledge of this subject, and when I am asked—when learned professors come to me and say "at what college did you learn this; where did you obtain all the information you possess on this subject?" I simply say "can you direct me to one where I could secure the information I possess on this subject?" They think a while, and then they say "no; we know of none." I secured my knowledge by reading the books of eminent scientists, and by putting two and two together I have been able to acquire a knowledge with which I hope to benefit humanity, by sharing with them the knowledge I possess, and I should be disappointed, indeed, if I were to feel that what I am going to tell you would be of no practical value to you. I have had some views prepared to illustrate the subject, and after you have seen them, I think you will agree with me that not all food is nourishment to the human body. I am just in the infancy of my knowledge, but the little I do know, simply serves to show the depth and importance of this food subject.

I want you to realize what the human body is composed of, and the elements which are found in the soil and in the air—that all these elements are appropriated by us in the various food substances which we require. There is of oxygen, 109 pounds; hydrogen, 14 pounds; they are compounded of water, so that the human body consists largely of water. Then comes carbon, 18 pounds. Carbon in the human body is the silage; it is the fuel we burn in the form of coal and graphite. If we burn bituminous coal instead of anthracite, we burn more carbon, and produce greater heat; so where we eat carbonaceous foods, the combination of oxygen, hydrogen and carbon gives out more heat and energy. Carbon is the starch food, and in most of the solid foods you find a large quantity of the carbo-hydrates.

Then we have another heating food, which consists of fats and oils. Now, the fats and oils are composed exactly of the same elements as the carbo-hydrates, but in different proportions. The fats are much more heating than the carbo-hydrates. We consume more carbo-hydrates than we do fats; they supply the energy. We must consume sufficient carbo-hydrates to work the heart, lungs, stomach, and all the organs of the human body; then, we must have energy to do our work. Thus, we can consume more of the carbo-hydrates than we can of the fats and oils. Our normal temperature is 98 degrees; if it exceeds that, we burn with fever, and when we have a fever, the tissues of the body commence to burn and waste away. In hot weather it is wise to abstain from fat foods, because they contain so much carbon, and should be eliminated from the diet as much as possible, if not entirely. We should not, of course, in hot weather, eat meats and other foods with a great deal of fat. In butter and cream the oils are so combined with other elements that we fail to recognize the fat. It is necessary that we should have a certain amount of this, in order that we may keep up a healthy condition of the cells of the body and blood, and to do that it is necessary to use a certain amount of fat. I know a great many children don't like butter and oils, and the mothers don't insist, and the result is an unhealthy child in a few years' time.

Then comes the proteins. We get in this form, 42 pounds of nitrogen. The tissues of the body are so wornout by the exertions of the day, that, what would we do if we didn't get this nitrogen? We require less of it than we do of the carbo-hydrates, but we must have an amount sufficient for our work. If we use a great deal of muscular effort, we must have a great deal of protein food, and if we have sedentary positions, a great deal less. A clerk does not require as much nitrogenous food, as a laborer in the streets. That is the reason a farmer always has a farmers' appetite.

Just so in the human body. If the tissues are not strong and healthy, it will not be well built up, and it is for the mother to consider, giving health to the children, and to nourish them with good healthy food to build up the bodies, to the age of ten years. We are all slaves to habits that have been formed. We may be able to overcome this to some degree, but we can never fully build up our bodies, if they have been neglected in early life.

Mineral elements—bones, teeth, hair, nails—and unless a certain amount of these elements enter into the body, especially iron, the blood becomes thin, and of a pale color, and we have a pale complexion. Iron is found in all the various fruits that are grown. And then we need a certain proportion of other minerals to form sound bones and teeth, which is especially desirable, because many children have poor teeth in early childhood. In the cities there is getting to be an excess of delicatessen stores, and people are getting to depend more and more on them, instead of studying for themselves this important question of diet.

In the olden times the primitive method of milling was as you see it here. The good housewife took two stones, one on top of the other, and rotated them together. From this was envolved the burr method, with which you are all familiar. From this method we have progressed until we have flours of various kinds, almost innumerable. In the illustration before us we have a wind-mill, such as used in Holland today. In olden times the farmers milled in this way. They also had the tread-mill—another primitive form of the milling. Then we have the modern water power mill, such as they operate in the far west—in Minnesota. This shows the difference between primitive and modern methods. In one of these large modern mills, the output is fifteen thousands barrels a day. So you see that as we have changed, the conditions of milling have changed, and so conditions have changed regarding food values. Very often people say "I have always eaten what I wanted, and I am perfectly well contented, because I am well enough anyway; I don't want to know any more about foods." I am always sorry for individuals of this kind. If there are any such in this audience tonight, I want you to try to do better in the future. What I am striving to do is to show you how to build up the human body, and keep it sound and healthy. Sin and suffering should be unknown, simply through injurious habits of eating.

The salivary glands. In these is produced the excretion which mixes with our food, and aids digestion. Still, we want to so try to govern our tastes that when we sit down to the table, the first question will be "is what we are going to eat the best thing for our bodies?" But this is rarely the case. Just consider whether you don't give more attention and care to your live stock than you do to the human body. And yet, it is of far more importance to keep the human body at its best, and how can we keep it at its best if we do not keep it in good condition by proper diet?

The cylinder method of milling, invented in 1870. It consists of a set of small steel rollers into which the wheat is fed, so that you can follow it to the bins in the process. The next is the bolting process. We have so many different kinds of flour at the present time. Many are the kinds of gluten, whole wheat, and wheat flour, and many are the cereal foods on the market today. And, by the way, in passing to these cylinder mills, I want to say this: so many of you depend so thoroughly upon your cereal foods that you think you must have them at least once a day. Some of you get the steam-cooked cereal foods, which are supposed to require no more cooking. They should, however, be steamed again from a half to three quarters of an hour. Don't even try to take them without first steaming them again. They are too tough for the human stomach to digest. Make them dry and crisp if you intend to have the stomach digest them. Then, it is absolutely necessary for people to masticate their foods thoroughly in order to digest them. Another evil we have acquired is the habit of hasty eating. Our teeth were given us for the purpose of thoroughly masticating our foods, and in order to keep both the teeth and the human stomach in good condition, it is necessary to use them properly.

Shredded Wheat biscuit is prepared by putting the whole wheat, after it is cleansed, into a boiler, where it is steam-cooked until the grains are twice their size, and then it goes from the boiler into the shredding machine. Here the fine teeth catch it, and spin it out like threads. The wheat goes through two processes of this machine until it comes out in the form of the shredded wheat biscuit, and this is why it is so light and porous. It is a very good cereal food, and sometimes makes a very good substitute for bread. Steam it first, the same as other cereals, and make it perfectly dry.

Starch grains differ in size very much. Here we have the rice, and here the wheat, here the oats, and here the starch. Here we see how they look when they are packed closely together. This is the interior of a grain of wheat. Then, cornstarch, as fine as it seems, if put under a powerful glass, shows the average grain very well, indeed. In the corn and wheat we have a substance that is not found in the other cereal foods. This is the reason why the wheat flour is used in bread-making. The gluten will extend, and gradually take in a great deal of air pressure. Baking-powder and yeast in bread making form a carbonic acid gas, and by adding them, we get what we call a well-raised loaf of bread, due to the accumulation of gas in the flour. The gluten is the pure part of the wheat flour, and that is why the entire wheat flour is such a very desirable food. We have in this row of cells that surround the grain of wheat a tissue builder that is excellent in case of kidney trouble, and helps, in a broken down system, to build up the tissues of the body very readily. Then we have another row of cells surrounding the gluten cells; they contain the mineral substances. It is very unfortunate that the bran should be lost in the preparation of the flour. It contains many of the elements necessary to build up the tissues of the body. Sometimes it is used in making up certain crackers for the live stock; you see, live stock always gets the best part of the food. As I have said before, we give it more consideration than we do our own human bodies. The same thing holds true with potato peelings. Bleached flour always interests me. The manufacturers tell us that the public calls for it, but they put it up for sale, and you can't get anything else, consequently you are bound to call for it. It contains a larger proportion of water than we have of the protein and nitrogenous elements. In the gluten and Graham flour you have almost the same amount of protein. Now, the entire wheat, is the whole grain ground, and the Graham is the roughened flour, that is, it has the wheat flour mixed with the outer hull of the wheat, and we call it Graham flour because it was invented by Dr. Graham. Now, the Graham flour is an excellent thing for the human stomach. It builds up the tissues of the body, and the mucous membranes of the stomach. The entire wheat is, as I have told you, practically the same thing in its constituents.

And then we have corn-meal and rolled oats, which contain a great deal of carbon—7.3 per cent. in oats, and 1.9 per cent. in corn meal. The white corn-meal is a very excellent food, and a very economical food, but these foods are too heating for warm weather. Nor should rolled oats be used in hot weather. Always use the polled oats, instead of the rolled oats, because it is more solid, and requires more mastication.

Rice: Always select that which has a grayish color; it contains a great deal more gluten. We should always try to get the unpolished rice; in polishing the rice, much of the best substance is taken away, and given to live stock. It makes such a difference in taste and material that you can hardly tell that it is rice.

Macaroni has 13 per cent. of carbon. It is also gray in appearance; when it is not, it is the result of analine dye, which is injurious to the human body. Now, observe that in the cereals we have a large percentage of carbo-hydrates, and also a great deal that is heating to the human body. In oats we have 1.50 units value of solids, and in macaroni 4.5.

Passing on to the next view, we will see what the potato contains. We are more familiar with it than with any other vegetable food. It has a large amount of water—5 per cent., and 18 per cent. of starch; the rest being what we call albuminoids and dextrose. If you pare a potato thickly, you will give the best part of the food value to live stock. In cooking, the cells take up the water, and swell, and become soft. The next view shows you how they look in the process of cooking. Observe the change in conditions in them. When the potato is well and thoroughly cooked, you will see how the cells are broken apart. Now, that same change takes place in the cooking of all vegetable foods, in some not quite so noticeably as in the potato.

Some of the most important vegetables to use are peas and beans. Soy beans are used largely by the Chinese, and are grown largely in this country as a fertilizer, but are not extensively used as an article of food by our people, although they contain a very large percentage of albuminoids. In the peas we have another protein food. Both peas and beans are very rich in protein, and give us, perhaps, more for our money than anything else of the kind.

The New Jersey Experiment Station has been experimenting with the tomato, and has succeeded in producing a seedless tomato. There method is to cut back the roots and then protect them. Do tomatoes produce cancer? A good many people think they are injurious as a vegetable, but this has never been established. The seeds are largely mineral, and we should spare them.

The egg-plant, fried as it usually is, is very hard to digest. It should not be fried at all. If used at all, it should be cooked in deep fat, and drained well, and eaten when hot, but it should be well cooked. Egg plant can be used as an escalloped dish, the same as the potato. It is not so nutritious as some of the other vegetables; peas and beans contain a larger amount of protein on account of less water. Egg plant contains 12.6 per cent. of water, while beans contain only about 4 per cent., so you can see there is a large percentage of water in the egg plant.

Then we have lettuce; in it, and in celery and in tomatoes, we have a very large percentage of water, and very little of the tissue building elements, consequently, less of food value, as you will observe. Then we have certain amounts of carbo-hydrates in the peas and beans—59.65 per cent. in the beans and 29.62 in the peas. Then we have 1.8 per cent. of fat. It is our duty, in summertime, to largely abstain from meat, and use instead, green vegetables.

Meat: Steaks are very much more tender than the other parts. The muscles of the leg are better developed because the animal uses the leg. It looks tough, but when we cook it, it contains more nourishment than any other part of the animal. If you can digest it, let it alone as much as possible, and if you cannot digest it, let it alone entirely. If you can't digest it, it contains no nourishment for you. The porter-house steak come from here: the top sirloin from here; it is a good, solid chunk of meat. Here comes the round, quite as tender as the sirloin, and from an economical standpoint a much more desirable piece, because it costs much less.

What makes the meat so much more tender up here? Simply because this part is not exercised so much, and has more fat. The fat extends along the muscular lines of the animal, and the meat there is tender on account of it. Down here is the portion of meat that is used for corned beef.

Here we have a diseased cow's stomach. This stomach shows the cow to have been suffering from tuberculosis, yet it was taken from a cow apparently healthy, and supposed to be in perfect condition. Now, there is no doubt a great deal of meat from diseased animals sold in the markets, but it is usually easy to detect on examination. Ordinarily a diseased animal becomes reduced in flesh, but in this case there was nothing of that kind, which is unusual. Western beef is supposed to be free from infection, because of live stock inspection. Be very careful in regard to the meats you make use of. Deal only at the largest shops; and, especially in hot weather, use as little meat as possible. When you do use it, see that it comes from a shop that is under government inspection, because the mark of the United States' Inspector means protection.

Meat is composed of carbo-hydrates, which are heating, water and fat, making it a very expensive food; so substitute, as much as possible, peas and beans, and macaroni and rice and eggs. They contain more of the tissue-building proteins, while meat is composed largely of fats. Salt pork contains 29.85 per cent. of fat. I will not give any more time to it than to simply say that it is a very undesirable thing to use.

Here we have the peanut, a very desirable article of food, mostly disagreeable to people, because the nuts have been roasted and reroasted a number of times, but if you can get them fresh, they are an excellent food. The butter is really better where you cannot get freshly roasted nuts. They take the place of meat at any time, but are not desirable in hot weather. They contain a very large percentage of carbo-hydrates. The butter is used as a dressing, and in large quantities is not digestible, but in small quantities, and thoroughly masticated, it is possible to digest it in a good, healthy stomach.

Milk: The appearance of the fat cells, and the full appearance of the cream. As you know, it is the fat in the milk which gives it food value, but too rich a milk or cream it is undesirable to use. In the skim milk we have more of the protein which builds up the tissues of the body. For the adult it is a most excellent article of food, particularly for invalids, because it builds up the tissues of the body. It largely takes the place of meat, and is much better for the kidneys. It is utterly impossible for the kidneys to keep in good, healthy condition where much meat is used. The alkaline substance in the blood needs to be kept in good, healthy condition. Take the milk between meals, and sip it slowly, so as to mix the saliva with the milk. Now, in order to get the best results from our food, we want to get the salivary glands to do their work thoroughly and mix the saliva with the food, so that the necessary chemical changes can take place in the human stomach. In the laboratory, showing the Babcock test of milk, to determine the amount of solids in it. This shows the bottling process employed in large factories. The bottle is sterilized, and filled, as you see it, and under the label is a little printed slip, giving the number of bacteria in the milk, showing it to be within the number allowed for certified milk, and assuring the consumer of a good, pure article.

Separating: In large factories where much of the milk is condensed, it is first passed through a vacuum vessel, containing about ten thousand quarts and sterilized, and then put in cans and tightly sealed with a metal top, so as to secure and preserve it. Then comes the process of making malted milk, and so on.

Fruits for food value: The banana grows in this form. There is no fruit more extensively used throughout the country; it contains a very large proportion of starch, which turns into sugar, after a while.

Oranges contain about 9 per cent. of sugar, and a large amount of water, but they do not contain as much citric acid as the lemons and limes. Grape-fruit is similar to oranges, but it contains a substance, in addition, which is similar to quinine. There is nothing better in the spring, on account of the citric acid it contains.

Pineapple has a medical value which the other fruits do not have. It is very good in throat trouble and diphtheria. It is very delicious. Take it and shred it with a silver knife, taking it from the core in that way.

Pure and impure milk in formaldehyde. The difference is very easily seen. Dr. Wiley of the Department at Washington, a gentleman of whom most of you have heard in connection with the Pure Food Law, and a very good friend of mine, from whom I have received a great deal of information.

People often say they have heart disease because their food is taken wrong, and remains in the stomach, and the stomach rolls it around in the gastric juice but does not digest it. In the stomach we have an acid, and in the mouth an alkalai which aid in the digestion of our food. If we don't take more nitrogenous foods than fat foods they will not assimilate them, and the result is indigestion. The stomach and the heart action in conjunction with the liver, which supplies an excretion called the bile, to aid in the process of digestion. When we eat hot breads and things of that kind, they pass on down to the lower stomach, and here they ferment and cause the trouble known as constipation. Thus, you see, you are responsible for this condition yourself. You know that unless there is a perfect assimilation of your food, the waste substances of your body will be returned to the blood, and a diseased condition of the body will result. It is unnecessary to dwell on the fact that it is necessary to take a large amount of water into the system to flush it. Fresh air and sunshine should be taken daily to keep healthy, as well as a strict attention paid to diet. Avoid over-work, and when you find yourself feeling very tired, take up some other occupation. Avoid coffee, and tea and cake. Cocoa is a food, much the same as the bean. They are really one and the same thing except for the process they undergo. But nothing takes the place of pure water. Two-thirds of the human body consists of water, and it is necessary to take a certain amount of water every day in order to flush the system. Sip a glass or two at a time; the more water, the less food you take, and the better it is for the stomach. Be very careful that the water you drink is perfectly pure. Plants cannot obtain nourishment unless the soil is pure and water taken into the human stomach to nourish it must be perfectly pure, also.

I think I have given you enough for one evening. I shall, however, be very glad to answer any questions you may have, because I think you are interested.

The CHAIR: We will now take up the next subject on the program, an illustrated address by Dr. D. J. Crosby, of the Department of Agriculture at Washington, on "The Most Useful School in the Country." I am pleased to introduce Dr. Crosby.

THE MOST USEFUL SCHOOL IN THE COUNTRY.

BY DR. D. J. CROSBY, *Washington, D. C.*

I intend to talk to you simply about two small country schools. I speak of both of them as country schools, although one of them is in reality in a little village, because both schools are attended very largely by the sons and daughters of farmers, and neither school is so extensive that it might not be easily reproduced by any township in Pennsylvania, and yet I think that these schools are in every way fulfilling their obligations to the community surrounding them, more fully than almost any other school that I know of in this country. Now, I believe that the most suitable school for the community, wherever it may be situated, is that school which makes use of the material growing and existing around the school for the purpose of helping to educate the child. In the city, one will make use of building operations, or work of a similar nature, carried on there, the animals in the Zoological Gardens, the business operations in the stores and markets, and things that the child sees every day, and with which it is familiar. The school in the country, unfortunately, up to this time, has been trying to make use of the same material as the city school is making use of, rather than adapting the real things of the country to their purpose. So our exercises in geography treat of the North pole, and the South pole, than they do about Pennsylvania, and the locality surrounding the child; these things are largely imaginary to the child, and harder for him to understand than the same principles applied to something with which he is familiar. When I went to school, I had a teacher whom I thought a most interesting teacher; he kept teaching us something, and kept telling us something new all the time, and used illustrations to bring out his point; he talked about things I knew something about, and made everything plain. That is just what I believe the country school should do, and if the country schools used country things, and the teacher illustrated them, these schools would be teaching agriculture in a practical way; so I want to talk to you a little tonight of two schools teaching agriculture, and I will use pictures very largely to tell my story. One of these schools is in Maryland, and one in Pennsylvania.

The one in Maryland is out in the country. There are several roads coming to a point, like the spokes of a wagon wheel, and at that point there is a little church, and the school, and the blacksmith shop, and two stores. Up to two years ago there was no high school within reach of the boys and girls around there, although it was a rich farming community. They asked the commissioners for the establishment of a high school within reach of their children, and some one suggested teaching agriculture in the school; the commissioners talked it over, and asked the Maryland Agricultural College to help them get a teacher to teach agriculture, and the Director came to us to help find a teacher, and we sent a man out from the Department with the intention of having him come back to us. The first year they paid him a thousand dollars, so that the first year's school cost them twelve hundred dollars; they were obliged to make some repairs to the old Quaker schoolhouse. The next year they raised more money and more children.

I will show you the methods they used, and the text-books, and I want to emphasize the fact that in order to teach agriculture, it is not necessary to have a great number of expensive text-books. They began not by studying the life of the plant as outlined in a text book, but the plants themselves in the field and in the garden. In this way they studied much more thoroughly than if they had been obliged to depend on the text book. Here we have the boys and girls; you see what size they are; they are studying botany, and studying it without any rudimentary preparation. This is the way they began their school work; later they went out and studied in the fields and gardens, and, in the meantime, in the schoolroom they were studying plants grown for the purpose—studying them to get at the plant formations—what the plant eats, how it gets its food—how the plant takes up large amounts of water from the soil, and gives back a part of that water, and in studying these phases of plant life, they are acquiring knowledge that will be of service to them in agriculture.

Then they began to study other things—plants, animals, and soil; they go out into the fields and study the formation of the soil; they bring the soil into the schoolroom, and experiment with it there, and get some idea of the management of soils, of the power of the soil, of the water it absorbs, and how; they can readily see which soils retain the largest amount of water, and why. Of course, it is in a crude way, and not as exact as the scientific studies of the soil, but in a way they are getting at the facts which will be of use to them in their work. There are many things in connection with farm and country life that are just as worthy of study as any problem in Euclid. They used simple apparatus—things they could make themselves. I visited this school a few weeks ago, and the boys and girls were deep in the study of some interesting experiments in the soil management. Each pupil had two cans filled with soil; this was wet and seeded, as you would garden soil, and they were trying to see the difference in capillary attraction in the different soils. While this exercise was going on, they took a kettle of soil, filled it up, and set it on the stove to see whether there was any evidence of moisture in it. The boys and girls lent themselves eagerly to these studies.

One important feature of their work there, in connection with their course of study, was the testing of seeds. They tested various kinds of seeds, and some of the farmers in the surrounding country sent their clover and other seeds to be tested for germinating qualities by these boys and girls.

They put a notice in the paper stating that any farmer who wished to have fifty ears of corn tested should send them in, taking test kernels from each, and numbering them, and they would be tested by the children in the school, and sent back to them. They had some eighteen samples of fifty ears each sent in while I was there. This interest had been very largely brought about by the holding of a corn show in the school this spring. After the corn show was over and the corn which took the prizes was selected, the teacher tested this corn, and found it very low in vitality, much to the surprise of the people who were there and thought they had brought good specimens of seed corn. They had been in the habit of simply selecting their seed corn by looks. The way they made these tests was this: they took a box about three feet square, dividing it up into little four inch squares by means of wire netting; in it they cut about two inches of ground, and over it they spread a piece of muslin, and in these little squares they put the kernels of corn to be tested, and covered it with damp saw dust. They turned the recitation room into a little laboratory, and each boy was given full charge of a box, and told to report its germination, or refusal to germinate, to the teacher.

Another interesting experiment was made in this way: A farmer who had some seed corn selected in the field, which he wanted to have tested, was also requested to bring samples of corn that had been kept in a crib under cover over winter, to see the relative value to the corn of being taken care of during the winter. The result was that the corn taken care of over winter averaged a germinating power of 95 per cent., while that which had been left out in the field averaged only 33 per cent. These are some of the things that those girls and boys are doing. They are getting their rudimentary problems in this way, and at the same time acquiring a practical knowledge of agriculture.

When they study live stock, they go out to the farms who have this live stock; they study the features that distinguish the breed of the different animals in the animals themselves. For instance, a farmer in the neighborhood had a large number of Yorkshires, and they went there to study the animals.

One thing they did that was of benefit to the entire community was the demonstration of spraying orchards a year ago. Quite a number of orchards were visited in the course of their spraying demonstrations. There were old orchards all around there that were not producing much fruit, and the principal made arrangements with the farmers to have their spraying outfit and their pruning outfit purchased by the State, and the spraying took place. These spraying demonstrations were attended by many farmers, and were of practical value not only to the school, but to the farmers, as well. The trees were pruned, and sprayed for the San José Scale with the lime, sulphur and salt mixture; a little later on they used the Bordeaux mixture, and as the result of those demonstrations, two or three other orchards were sprayed last spring, and another this spring, and these sprayings have proven of great value to the orchards.

The pupils appreciate that school, and the community there at Calvert Centre appreciate it; the first year they paid the principal eight hundred dollars for seven months work, and expended in all twelve hundred dollars. This year they give him sixteen hundred dollars, simply as an evidence of their appreciation of that kind of teaching. They appropriated eight thousand dollars for a new schoolhouse, and got from the Legislature an appropriation of two thousand to aid in the management of that school. It shows that the people appreciate the value of this kind of teaching.

Now, in Pennsylvania there is the other of the two schools that have been called to the attention of the National Educational Association; it is one of the two schools that we were asked to visit this spring and report upon. It was called to their attention simply and solely because it is a wonder in the work it is doing for the benefit of the community. It is located, as most of you know before I tell you, at Waterford, a little village of about fifteen hundred inhabitants, and is conducted in connection with the township high school. It is conducted in an old school building of two stories and four rooms—two schoolrooms and a laboratory and recitation room. In this little school, which was erected at the cost of probably between twenty-four and twenty-nine hundred dollars, we have an example of the most successful agricultural teaching. They follow the same plan as they do at Calvert, of studying the plant and the animal, and using the text-book simply as notes. They have their little laboratory, where they study the things pertaining to agriculture, and make nearly all of their own apparatus, and perform their own experiments. I never saw a lot of boys and girls of that age who would go into a laboratory and depend so much on their own illustrations as did these boys and girls of the Waterford school. What would you and I have thought twenty-five years ago, to go into that one room and see and do a thing like that? Why, the boy going to an agricultural college fifteen or eighteen years ago did not get as much practical instruction in agriculture as do these boys and girls at Waterford High School today. It simply shows us how education along these lines is going forward and how we can lay hold of the matter, and impress on our teachers that that is what we expect them to do in our rural schools.

Some of the boys are studying grain crops; they visit the fields, and there study the conditions, and then this is followed by a talk by the teacher on whether clover or some other form of bacteria is most important in the raising of farm crops, and you would have been surprised at the interest manifested by those boys, and their familiarity with the reports of the Pennsylvania Experiment Station and the Maryland Experiment Station, and the United States Department Bulletins. They go to them for their information. Now, they are studying types of ears of corn; they are taking into consideration the filling out of the butts, the length and uniformity of the ears, the number of rows, and so on, and whether the corn looks healthy and well developed or whether it is deficient in vitality. They acquire as much practical knowledge as could have been acquired at any agricultural college a few years ago.

Here you see a class studying the money value of the farm products; they are trying to find out whether you shall sell off your clover hay which is worth $9 in fertilizer for every ten dollars you sell, or eight when you sell wheat bran, or seven in ensilage. They are not only teaching these boys and girls arithmetic, but they are teaching them how to use their capital, in the shape of farm crops, economically.

Here are the boys and girls out with their pruning outfit. They not only learn the theory of it, but they actually go out and prune trees and watch them to see whether they will grow. They tried to get a little land to turn into an orchard, but the price wanted was to high. Then a public spirited citizen offered them the use of about three and a half acres; half of it has trees on it, the other half has not; he allows them to use it as they will, the only restriction being that they cannot cut the trees down. Here you see a spraying demonstration on a small tree. They are doing the work, and asking the teacher for the theory of it.

This picture was taken nearly two years ago, and shows the boys studying the animals for the purpose of learning about live stock; they go to see the actual animal, and learn in that way the difference between the meat cow and the dairy cow.

In the way of machinery, they buy what they can, and borrow what they can; they have two gasoline engines, a manure spreader, a corn harvester and two or three other implements.

When I visited the school one day, they were studying horses, and discussing the difference between the different breeds. It happened that there was a large Percheron stallion in the village, and one of the boys asked the teacher if they could not arrange to go down and see the animal. You will notice about twenty or thirty boys about the animal; the teacher asked questions about the different points of the animal; they agreed that although it had too much head, and too much of a Roman nose for this grade of a horse, it was an excellent specimen of its kind. In this way those boys and girls are acquiring a whole lot of knowledge that will be of value to them in their life work.

As the result of a Farmers' Institute held in that town last winter the school has become very much interested in poultry. Mrs. Allen, who is on your force of lecturers, talked to them on poultry culture, and got the boys and girls, and their parents interested in poultry. The teacher took advantage of this wave of interest to organize a class in poultry culture; sixty-five went in, and they were divided into two classes. They borrowed four incubators, one from the manufacturer, two from a poultry fancier, and one from a farmer; each incubator was given in charge of two boys, or a boy and a girl for a week, who had to look after the eggs and the temperature, and all other matters connected with it; these were then discussed with the class, and two more took charge of it for the following week, so as to let the work go round, and give all these boys and girls authority and opportunity to assume the responsibility, of which they were very proud, and did all in their power to make a success of the undertaking. They had at the outset three brooders, two inferior ones, and one first class one, made by one of the boys in the school. They had about a hundred and seventy-five chicks there, taking care of them while I was there, and I want to say to you that while this particular wave of interest was aroused by a Farmers' Institute, the farmers themselves told me that the success of the Institute was largely due to the way the school teaches agriculture. At this particular Institute the boys and girls were eager in their attendance, and made notes of what was said, and these notes were afterwards discussed in school with the teacher.

Now, it seems to me that in the two cases I have given here we have examples of how agriculture should be taught in the schools, and how it can be adapted to the different conditions in different localities. I don't believe you want to teach children in Northern schools how to grow oranges and bananas, and other Southern crops. I believe you want to take the things that grow right there in that locality and use them to illustrate to the children the life of the plant or animal. We are all interested most in the things that concern us most when at home.

This particular slide is taken from one of the Wisconsin country schools. I simply introduced it here to show what the country school in Wisconsin is doing in the way of agriculture. They are simply carrying out a little further the ideas I have presented. This particular school does the testing of milk and cream for butter fat, and, by the way, they are doing the same thing right here in the Waterford school. The creamery at Waterford suspected that it was getting some adulterated milk. They sent samples over to the school, and it was tested, and found to contain water. The creamery knew well enough where this milk came from, and told the man that his milk contained water. He admitted it right away, "but," he said, "I will tell you how it happened; that particular morning I was very busy, and I picked up a little can and emptied it into the big can, and I never noticed that it was water I was pouring into the big can." He did not, however, mention how it happened that he had been sending in watered milk for sometime. Now, these pupils not only tested the milk for the farmers, but they made tests of seeds, for germinating power; for smut in corn, and rot in potatoes; trees were pruned and sprayed, and plans suggested for milk and poultry houses, and blacksmith work done in connection with their instructions. They make models of buildings, and then build their buildings from their own plans. They don't however, have much opportunity to put their ideas into real buildings, but must content themselves with models. They give information regarding crops, select pure bred stock for buyers, and send out bulletins that the school publishes.

There is no reason, it seems to me, why we should not teach agriculture in this way in many more country schools. The great preliminary, it seems to me, is to get the teacher competent to give these instructions. We must have a teacher with country sympathies, one who is himself interested in agriculture, and in the things around him in the country. It seems that the difficulty here at Waterford is to keep a teacher; they can only pay seventy-five dollars a month, and they cannot usually keep a teacher from an agricultural college longer than one year, because the services of such a man are in demand at higher salaries. I figured up the salaries of ninety graduates of 1907, when they are getting on an average of ninety dollars a month the first year. There you see the difficulty in getting any such man in such a position. The only way is to get them in as principle, and offer them a salary as principal, and if you get a man capable of doing this kind of teaching, he is well worth his salary. These young men in these schools are earning their salaries, and nobody is complaining that they are paying too dearly for this instruction.

Now, then, the thing is to get your township high schools started along the same line as the Waterford school. It will probably cost about six hundred dollars a year more to run the school in that way, but I don't think there will be much difficulty in finding that six hundred dollars once you get started up, and get people interested.

DR. CONARD: Did you state where that Maryland school is located?

DR. CROSBY: At Calvert Centre.

A Member: Which is the older school of the two?

DR. CROSBY: Waterford; and the young man who was about the first teacher in the Waterford school is now the teacher of the Calvert school; putting into practice the experience he has gained there.

The CHAIR: We will now stand adjourned until tomorrow morning at nine o'clock.

New Castle, Pa., Thursday Morning, May 28, 1908.

Mr. Herr in the Chair.

SECRETARY MARTIN: Before entering upon the program of this morning, I want to make one or two announcements to which I ask your attention. Delegates, and persons who have come here to attend this institute, will please register; we are very anxious to have a full list of those present.

This afternoon at about four o'clock the trolley will run from the New Leslie Hotel to Cascade Park. This will be in ample time to enjoy the park, and to get back to the hotel in time for dinner.

The photographer who took our pictures yesterday has a negative here, which is pronounced by all who have seen it as a very excellent one. We want this picture for publication in the bulletin of the proceedings; anybody who wishes to have one for their personal use can procure the same for seventy-five cents. Orders can be left with Mr. Seavy, the photo will be mailed to them.

I have been asked several times whether it is necessary to take a receipt for your hotel expenses. It will be necessary to have this receipt, in order that your voucher may be passed.

MR. BOND: Will it be necessary to take a receipt for anything below a dollar—say for single meals on the road or something of that kind?

SECRETARY MARTIN: No receipt is required for railroad fare; simply state the number of miles from your home to New Castle. Meals on the train require no receipt; bills less than a dollar require no receipt; simply mention what the item is for; if you say "incidentals" we will hardly know what it covers this is a rule of the Auditor General, and it affects our Department as well as all other State departments.

MR. CLARK: Some of us have brought our wives along; don't you think we should be entitled to their expenses, simply as an inducement to the other fellows to bring their wives the next time?

SECRETARY MARTIN: The good these husbands will receive from having their wives with them will more than repay them for what they expend for them. My one regret is, that in handling public money as I do, I have no authority to pay their expenses; I believe they deserve it more than the men.

MR. HOOVER: There is one thing that is not quite clear to me, and that is in making out our bill of expenses, is it necessary to itemize such little things as a meal or two?

SECRETARY MARTIN: Yes; it must be itemized; for if the amount had been expended for a meal, say so; if for bus hire, mark it "bus hire," it is necessary that everything be itemized to pass the inspection of the Auditor General.

A Member: Is it necessary that we make affidavit to it?

SECRETARY MARTIN: Affidavits are required only from those who are on a per diem salary; the delegates who attend this meeting will not be required to make affidavit to their expenses.

DR. CONARD: Is there not a form of certificate on the voucher?

SECRETARY MARTIN: Not on the form of voucher you have. The vouchers given to Institute lecturers, and others on per diem salary have the form attached.

We will now proceed with the program; we are already a little late; this is the only session devoted to the County Chairmen and Institute Workers, and every county chairman and every institute lecturer is directly interested in the questions on the program this morning; we want careful criticisms of the work in Pennsylvania, and suggestions how to improve it.

The CHAIR: Ladies and Gentlemen: This is really one of the most important sessions of the Normal Institute; we hope this session will be participated in by as many as possible, and also that no one will consume more than the usual amount of time; we don't expect to have you tell us all you know at this one meeting; if you have any criticisms, we are ready to hear them, but don't make them too long. We will now go on with the program; the first speaker is our friend, Mr. Seeds, who needs no introduction to you.

Mr. Seeds then spoke as follows:

BENEFITS TO BE DERIVED FROM FARMERS' INSTITUTES.

BY ROBERT S. SEEDS, *Birmingham, Pa.*

I want to say that I realize that my time is limited, but if I forget myself and don't know when to stop, if the Chairman will give me a signal, I will be glad.

We think of this as the important session of the Institute, where we can tell one another of our trials, and exchange good suggestions. I want to say that I have been in the Institute work eleven years, and when you talk about the benefits of Farmers' Institutes, I have stood by and watched them for all these years. Before I was in the work, I am ashamed to say, I used to sit back and criticise the work, and criticise the men who were trying to start the work—men like the Chairman, Col. Woodward, Mr. Critchfield, Mr. Kahler, who were trying to help the farmer by getting this good work started. These are the men to whom you should take off your hats today. Then when I went into the work I came in for my share of criticism. When I went into the work, Mr. Martin sent me down to Montgomery county; I was there two days, and did my best, and then some one called me aside, and asked me what I had done for the political machine because I got the job. I told him I had done nothing to get the job, because I am one of the staunchest Democrats—and there is no collar round my head either.

There is no use trying to describe the benefits of the Farmers' Institute to the farmer of Pennsylvania, and to the American people; it benefits not only the farmer, but the man in the city as well. When a man farms more intelligently, he benefits not only himself, but everyone dependent on the farmer for his subsistence. The greatest benefit the Farmers' Institute has created is the demand for more Farmers' Institutes. When the farmers of Pennsylvania are told they can't have an institute, they go down and get up a meeting and talk institute until they get one. That is the way things are going in Pennsylvania, and not only in Pennsylvania, but all over the United States as well.

I have just come from Alabama, where they are doing everything they can to get the best talent to talk to the farmer and are having one institute after the other, and out in Iowa they are going to have more than a hundred of them this summer. Why this institute movement is growing to such an extent that if, within a few years, I don't talk to a Farmers' Institute in the city of Chicago, I'll miss my guess. Mr. Harman tells me that they have more inquiries in regard to agriculture from the city than from the country. That has largely been brought about by Farmers' Institutes. I believe that the boys at State College whom Brother Agee talks about were brought there largely through the agency of Farmers' Institutes. I know that when I am at a Farmers' Institute and talk education to them I talk State College. I don't condemn any man for differing with me, but when you talk about your Farmers' Institutes, and the benefits to be derived from them, I don't see how any one can differ with me. Now, I don't farm like Brother Detrich; he does not agree with me there; he believes in, and pratices and preaches the doctrine of barnyard manure. I believe in putting the sweet clover plant and plowing it in under. When the land is poor, and we cannot raise crops, along comes the sweet clover and enriches it. I saw the people of the South, where the land was poor and would raise only scrub timber, cut down that timber, put on a little fertilizer to make that land rich, and then put it in sweet clover. I am in favor of Brother Detrich's plan of putting on manure to enrich the soil, and then putting it in sweet clover. He has the barn that he can turn into the factory; not all of us have that, or can have it, but the sweet clover, and the legumes all of us can have.

The Farmers' Institute has given us rural free mail delivery; it has advanced the cause of country education. I tell you, I can go down on my knees to the Farmers' Institute of Pennsylvania for what it has done for the people of the State. It has brought the farmer into touch with his fellow men, and that is what every man needs. I have travelled all over this country, and I tell you, what I am, I owe to my fellow men. He needs to get out and rub elbows with other men, and get their ideas and their methods; if you live like a hermit in your cell, you become narrower and narrower, until at last you lap over, so narrow you get. You want to get out, and get in touch with other men, and this is what the Farmers' Institute has brought about for Pennsylvania.

The CHAIR: According to the program, this is one of the subjects on which there is no discussion; I guess Brother Seeds has covered it pretty well, so we will pass on to the next subject—"Overcrowded Halls and Precautions for Safety of the Audience," to be opened by Brother Peachey:

OVERCROWDED HALLS AND PRECAUTIONS FOR SAFETY OF THE AUDIENCE.

BY J. H. PEACHEY, *Belleville, Pa.*

Mr. Chairman, and Friends of Agriculture: We all know what it is to have these overcrowded halls, and these overheated halls, and these unheated halls, and if you speak to the people about it, they will tell you it is the best they can do; that they can't overcome these things; but, I tell you my friends, that it is time that we county chairmen, and committees, and institute lecturers do something in regard to these rooms, and these halls, and I tell you the time is here when we can demand something better than we have had. When I think of the Iroquois theatre, and of the Boyertown theatre, of the Carrollton school, I have more cause to shudder when I think of the halls in which our institutes are often held. When I talk to my people at home about these halls, they say "I think you had better stay at home, because you are safer at home than in these halls." When I think of these things, and then think that no later than last spring we were asked to hold our meeting in a little hall not large enough for the people, while next door to it was a large church that we could not have for a Farmers' Institute, I think it is time to say something. I think that no brick or stone and mortar is too good for a Farmers' Institute, and if we cannot have these places, then it is the duty of the Institute managers to take the Institute to some place where there is a hall fit to hold the people who come here.

Then we got somewhere else where they took us to the Grange hall; that was a small place at the top of a stairs, and when I looked up at the ceiling, I saw no hole, nothing arranged for ventilation, and I could simply see the people dying up there for want of pure, fresh air. Then the stairs—well two men like Prof. Watts could possibly get down that stairs at the same time in case of fire, but two men like Dr. Detrich, never. I tell you, these things are things to think of. What is the remedy? Well, I have just told you the remedy. I believe that the experimental stage of the Farmers' Institute has gone by, when we were compelled to take any kind of a building just for the privilege of holding the institute and getting the people interested.

Now, I don't want to take up too much of your time this morning, but there is another thing I want to say. I have just said something in reference to underheated halls. Four years ago I was compelled to speak in a church, and when I went there, they were just putting in window lights to keep out the cold; they made a fire about twenty minutes before the time of opening the Institute, and when the time came for opening, it was about twenty degrees colder inside that building than it was on the outside. I went home from there with rheumatism, which the doctor said I had caught from a cold, and I knew where I had got that cold; I lay there and suffered for three long weeks, and do you wonder I sometimes hesitate when Brother Martin asks me to go to work? Some say that this is the fault of education; I think it is the lack of education, and I think it is one of the things that the Farmers' Institute lecturers should talk about from the standpoint of health. We talk about the dairy cow, and we talk about the soil, and we forget to talk about our own health and our own comfort. I want to say to the Institute lecturers, and county chairmen, that it is your duty, and your right and your privilege to demand suitable halls, and if they refuse them to you, do not hold your institute at such a place, but go where they will give you a hall that is not a danger to your life and health. Don't take the institute to a place where the lecturer has to shudder when he enters it.

The CHAIR: We will now devote a few minutes to the discussion of this subject.

MR. CLARK: This is one of the most essential subjects to be brought up at this session, and one of the greatest difficulties with which the chairman has to contend—that of finding a suitable place in which to hold the institute. Most of our churches and halls are defective in ventilation, even when they can be had; that leaves only the alternative of hiring the opera house; and best place to hold the institute is the hardest place to get. We had an institute in our county last year, and the accommodations were not sufficient. Some houses were too cold; some were too warm; some were inconvenient of access; what are you going to do about it? Mr. Peachey is right in advocating that we make an effort to arouse the people to the necessity of doing these things in a better way, but I am sure that we have thought the matter over a good many years and so far as I can see, we have never been able to find a solution yet. You may come to one place and find everything all right, but such places are very few, and what are you going to do about it?

MR. STOUT: While this matter is open for discussion, I want to say that there has been an improvement in this matter in my section, and in other sections. I remember the time when we were denied access to the churches, but the last few years they have been open to us; the people are opening up more than they used to. They are beginning to show proper respect for the farmer, and this is as it should be.

MR. HERR: I want to emphasize what Mr. Stout has just said; when I came to a place where they gave us a badly heated and badly ventilated hall, I spoke to them in good, plain English. I said "you have your teachers' institutes, and you give them the church; why can't you do it for the Farmers' Institute? You are not showing proper respect for the farmer. Are your teachers and your children any better than you are yourselves; why do you give to them that which you won't take for ourselves?" They had barrels for seats at that institute, but at the next one, whether it was the result of that talk or not, I don't know, but there were no barrels there. I think it is the Institute lecturers' place to speak of these things, and teach the people to respect themselves, and show proper respect to you.

MR. HOOVER: While this subject is open for discussion, I think it is my duty to give a little of my experience in Lancaster county. As has already been said here, there are cases where churches cannot be had to hold institutes. I have tried a number of times to get the use of a Sunday School chapel to which I have been a liberal contributor, but could not get it. Then a few weeks ago we decided to hold the institute at Neffsville, since we could not get the chapel, and had engaged the place, but before the institute was held the place was sold, and we could not have it; then we tried again for the Sunday School chapel, but could not get it; then we tried for the schoolhouse, but it was engaged, so we finally had to go to Eden to hold our institute. This shows what difficulties the county chairman often has to contend with in finding a suitable place.

The CHAIR: We have still five more minutes for discussion.

SECRETARY MARTIN: Now, gentlemen, this is a question in which you are all deeply interested; you have all spoken in halls in Pennsylvania where you suffered from lack of ventilation and proper heating was not supplied. The danger from fire was imminent in many places; and you have all had tribulation in securing proper places in which to hold our institutes; please bear these things in mind now, and discuss them, and see what can be done to remedy conditions.

MR. McHENRY: I am anxious to have some information; therefore I enter into this discussion. Let us know how to better arrange these things that Brother Martin speaks of.

I am surprised to hear from Brother Clark that in Westmoreland, and in Lancaster they have difficulty in getting into the churches. We had a little trouble in that line in my county in the beginning, but we overcame it; the real question I want answered is how to arrange for over-crowded halls. I go to an institute, and get to the church, and find my audience is one half larger than I expected to have it, and that the building is over-crowded; how can that be arranged?

MR. TAYLOR: The question Mr. McHenry has asked is the one I intended to ask. In our county we cannot make our halls and churches large enough to accommodate the crowds that come; now what is to be done?

MR. KESTER: I think I have found a solution for that problem; I have noticed that the most useful and practical sessions of the institute are not over-crowded; it is mostly the literary sessions that are over-crowded. Now, that is not intended as a criticism; they are of practical value also; yet there are times when the program is so arranged that they take up the greater part of it. By giving more time to the practical subjects, and less to the literary and musical, there is less danger of over-crowding.

MR. THOMAS: This is a most important subject, and one that I have been waiting to hear discussed; it is only a few years ago that I heard discussions on the question of how to get better audiences at Farmers' Institutes, and now we have come to a point where the audience has grown to such an extent that it has become a question as to how to take care of it. My father organized the Farmers' Institute at Mechanicsburg, and one of the subjects discussed was how to get an audience at a Farmers' Institute. We got Brother Ferguson, who you all know, to come and speak to us; he has been getting better, and the institute work has been growing, since then. He has charge of the next meeting, and the subject now is over-crowded halls. Now, so far as safety goes, there is no necessity of building a hall two stories high in a place where land is cheap; in the city it is all right to have the sky-scraper; land is high there; but where land is cheap no hall should be more than one story high; it is safer in time of danger.

MR. FERGUSON: This is an age of missions, and missionary enterprises of all kinds; now it seems to me that the Farmers' Institute workers would be the proper people to do missionary work among the people in regard to finding suitable places in which to hold meetings. I say this in no spirit of bragadocio; in my own county we have trouble in finding suitable places; it is all right to hold the meeting in church, and here is where the institute worker has a fine missionary field to convince the people of this.

MR. BRODHEAD: The question is how are we going to get around the over-crowded halls at the entertainment session? I will give you a pointer; have the entertainment session the first session of the first day; I will guarantee you will not have very much trouble.

MR. BARNES: Now, in regard to the audience in our county, I am proud that we have some as fine audiences as there are any in Pennsylvania. We have no trouble in getting the churches in our county, and the workers are entertained just as nicely as the preachers, or any one else. The farmers are glad to take them home, and show them what our hospitality is like. The preachers of our county have fallen in line with us the last three years, and the churches are open to us.

MR. SEAVY: As I understand these institutes, they are for the benefit of the farmer, and why should we hold them in the city, where they have opera houses and good ventilation? I do not consider them the place to hold these institutes; it is the backwoods districts that we want to benefit, and in order to do this, we must go to them. We must go and find whatever there is in the shape of a hall; if there is no hall, there is probably a church we can have; if it is a little church, I have no trouble in getting them interested, and if it is a big church, the people come, too. Now, what can we do? There are men here who have been in our county, and have begged the people to come to these meetings. Now, what shall we do? We have not got the hall, but we have got the people; shall we go into the city and engage the opera house? Not if we can get churches in the country, and we have never been refused. The place to hold the Farmers' Institute is in the country, among the farmers, whom it is to benefit.

PROFESSOR OWENS: In regard to ventilation, it seems to me that after every session the windows should be opened and good, fresh air left into the room; then the air would not be so foul as we sometimes find it; if the fire were built a little earlier, it would be warmer at the opening of the first session; these are difficulties very easily overcome, it seems to me.

MR. BAYARD: I merely want to say for fear I won't be here when the proper time comes to open this question, that if you will hold your next annual meeting in Pittsburg, I will promise you a good, well-ventilated hall, where there is no danger of over-crowding —and there are also plenty of breweries there, so none of you need go thirsty.

PROFESSOR MENGES: I would like to extend an invitation to this Institute to come to York next year, we have excellent places for meeting, and there are two big breweries there; I know the brewers, and there need be no danger of any one suffering for want of something to quench his thirst.

The CHAIRMAN: That will come up at the next session; the place for the summer meeting is always decided at the winter meeting.

We will now leave this subject, and go on with the next number on the program—"Should Questions Foreign to Educational Matters be Taken up at the Educational Session," to be opened by Mr. L. W. Lighty.

Mr. Lighty's paper is as follows:

SHOULD QUESTIONS FOREIGN TO EDUCATIONAL MATTERS BE TAKEN UP AT THE EDUCATIONAL SESSION.

BY L. W. LIGHTY, *New Berlin, Pa.*

All institute work is or should be educational and to my understanding all of it is really educational because every effort made is intended to better fit us for our work. That, indeed, is real education. We continually tend towards narrowness. We confuse education with information. An education is not the result of a course of study; it is the result of a course of experience. Education is the individual's development that enables him to use his hands, his head and his heart to the noble purpose of life. Spencer, the greatest thinker of all times, said " education is the attainment that enables a man to live completely." But definitions are narrow and people often narrower. Many of us, indeed the majority of us think an education consists of an uncertain amount of stuffing and examination passing. Because of the narrowness of teachers and school workers in general and the extreme apathy of patrons in regard to school improvement some form of agitation seems absolutely necessary.

Becoming cognizant of the fact that our schools, teachers and school conductors are not as efficient as we have a right to expect the Educational Session of the farmers' institute was organized to help remedy some of the defects. The Director of Institutes suggested that a definite time be set aside to consider the improvement of rural educational facilities.

Every intelligent person knows that the future welfare of our country depends on the physical and mental equipment of the rising generation. If we prepare them to live completely, if we train them to use their hands, their heads and their hearts to the noblest purposes of life the glory of the future of our country can hardly be imagined.

Let us not forget that the scope of this institute work is as wide as are rural human activities. The lecturer whose only ambition is to tell folks how to plow, sow and reap better or who would rattle off class-room platitudes in a mechanical, phonographic, humdrum way has indeed missed his calling. If we would reach the people we must be the people, must know their needs, not only from an academic but a practical standpoint and not only must we know but be able to present our message in an interesting and inspiring way. We must inspire the mind and fire the heart of the hearer so his hand may act in faith in the uplift we would bring to humanity.

I want to urge upon all lecturers the imperative need of this work of rural educational improvement. Nothing you can bring to the farmer, if properly presented, will be as helpful and as gratefully received as good, sound, intelligent advice and discussion in line of improving rural educational facilities. We work towards our ideals. The ideals we try to create or set up for our boys and girls are the beginnings of the endings we see recorded in our daily press. Work with your hands is a disgrace, the Dago can do that. You must aim high. Study your books. Pass your exams. Embrace a profession.

Behold the shyster, the fifth rate preacher, the poor cross-roads sawbones, all trying to eke out a living in an honorable (?) way. A steady stream towards the city to look up that honorable business career where labor with the hands is eliminated. Then behold the records of crime and divorce. We must have better teachers, better school-houses, better school directors, better county superintendents, and to get these we must have better, wiser and more wide awake patrons of the rural schools.

Now, there is no factor, no institution, no force of any kind that can as quickly, as thoroughly and as sympathetically reach all these people as the farmers institute lecturer. My friends you may be a power for good in this work beyond your fondest dreams. Prepare so you may look at this question from a broad gauge standpoint. Study our educational system and trend, learn our sociological needs, the mistakes of the past, the successes of the present and then be ready to point to some practical solution.

A word to the County Chairmen. You need and want the Educational Session. Select the best evening and always have it in the evening unless you can have it on Saturday afternoon, because you want to have the teachers attend. Interest the County Superintendent so he will not only attend personally but will urge the teachers within reach to attend. Interest some of the leading teachers in the matter by placing their names on some committee, and where feasible have one or two of them on the program for a short paper. Make a very special effort to have the school directors, teachers and County Superintendent present at the Educational Session. Impress them with the fact that at no other meeting can they meet the patrons on as democratic a basis as at the farmers' institute and also with the fact that the State, through the Division of Farmers' Institutes, is making special efforts to assist them in rural educational betterment in all its lines. Do all in your power to get their active co-operation and almost invariably you will succeed and the Educational Session will be a success. Insist that this session be devoted entirely to work for rural school and educational improvement.

Let the township high school, centralization or consolidation of rural schools be the leading topics, but do not forget better teachers, better houses, better sanitation, length of school term, school gardens, school libraries, agriculture in the rural schools, and many other topics of vital importance to every school man and every patron.

I care not if you succeed in teaching every one how to grow 50 bushels of wheat, 100 bushels of oats, 200 bushels of corn and 5 tons of hay to the acre; how to make every cow yield over 500 lbs. of butter per year; how to make swine weigh 300 at six months; how to make sheep net 20 per head; I say though you succeed in all this if you fail to give your children a proper opportunity to broaden their mental horizon; if there is no good foundation of physical, mental and moral training to start it will be woe, woe to the future of our country, because all your fertile acres and all your fine cattle avail nothing when good men and women are lacking. Indeed when we come to consider the matter seriously the rest of the work seems insignificant as compared with the future welfare of our children and our great Republic. I repeat, let us do all in our power to strengthen and widen the scope of the Educational Session of the Farmers' Institute.

The CHAIR: The question is now open for discussion.

MR. SCHWARZ: I imagine that no one knows me will accuse me of being opposed to education, when I say that I believe too much time is devoted to the subject of education. All our subjects are educational, and why take one of our sessions and devote it to other topics is more than I can understand. I believe that all our time should be devoted to more practical subjects. I believe it is a mistake to go too far in this matter, and there is more valuable time wasted in this way than in any other. I am not opposed to education, but there are other institutes strictly in the interest of education, and I do not believe we should devote our limited time to this subject, but take up the more practical subjects that are of interest to the farmer in his work.

MR. HUTCHISON: It has been my privilege and my pleasure to have something to do with the Farmers' Institute for eighteen years, and I have found that the sessions devoted to educational matters were the most successful, and I have also found that the presence and assistance of the ladies has been of great service in helping to make the sessions successful. People get bored if they listen for three or four days to talks on lime and soil and other matters of this kind. They want something to relieve the monotony. I was surprised to hear my friend Schwarz talk as he did. We had an educational session at our institute, and had several of the ladies read papers, which were of great value and assistance in helping to make the institute the success it was. The people like it, and it keeps them interested; I have never heard any one grumble at the educational session unless it was, once in a while, some old fellow who had passed his usefulness, and should have been translated to some other clime. We can't have too much education. Let us talk education, and make our educational session the most interesting one.

PROF. MENGES: In regard to the ladies' session, I would like to emphasize that matter. Why, in Montgomery last week we had two sessions—one in Montgomery, and one in Chester; at the session at King of Prussia the ladies, and particularly Miss Thomas, went to a great deal of trouble to make that session a success. They brought out from Philadelphia and the surrounding country some of the best women speakers I have ever heard. I don't like to say it, because I was there myself, but they had the best and most interesting session of all. I believe this idea of a ladies' session should be worked up. When you get the women interested they usually make a success of a thing; things are changing, and the sooner we recognize this at our institutes, the more successful they will be.

MR. SCHWARZ: I am not talking against a ladies' session, or against an educational session; only I don't like to see them made separate sessions; I believe they should be made a part of our regular sessions.

PROF. WATTS: I believe in the educational session of the Farmer's Institute, and think nothing should ever be substituted for it. It is the foundation of the agricultural structure. It is necessary to educate the farmers' boy and girl beyond what they acquire in the little country school, which is often their only educational advantage; I am ashamed sometimes of the facilities afforded by these schools; it is only by bringing these subjects thoroughly before them at our Farmers' Institutes that we can hope to raise the standard of education in the country. By all means let us try to make the educational session the best session of the Institute. Most of the boys and girls leave school entirely at the age of twelve or fifteen years, and something must be done to advance them, and to keep alive their interest in education, and this is a part of the work of the Farmers' Institute.

SECRETARY MARTIN: The next subject on the program is "What Recognition Should be Given to Music at the Institutes?" the discussion to be opened by Mr. Herr.

WHAT RECOGNITION SHOULD BE GIVEN TO MUSIC AT INSTITUTES?

BY JOEL A HERR, *Millhall, Pa.*

1. The primary object of Farmers' Institutes is instruction. This should be the leading thought in the minds of the instructors.
2. The value of the instruction is measured largely by the way it is received by the audience.
3. In order to have an appreciative audience for any great length of time, there must be some variety in the exercises—a little spice —a little seasoning.

4. To him who has a musical ear there is nothing that will relieve the monotony of the exercises as effectively as some choice music, especially that of the human voice accompanied by instrumental music. This increases in effectiveness when the words of the music are appropriate to the occasion.

5. The value of music is somewhat measured by the character of the institute session being held.

If it is an evening session consisting of lectures of considerable length that require very close attention and thought to appreciate, it is very important to have a resting spell between talks and nothing is so much appreciated at that time as good music.

6. In mixed audiences there are very many persons present who are but particularly interested in many lines of institute work. To these people music is particularly refreshing and serves to relieve the tension on their minds on the various subjects being discussed, and assists in preserving order and preserving better attention to the more serious subjects on the program.

7. Most people attending institutes feel like taking some part in the work of the institute, and many who do not feel competent to enter into the various discussions, are willing to do whatever they can to make the institute a success, and would cheerfully contribute their musical talent to the interest and entertainment of the institute. This is particularly true of ladies, whose timidity or modesty usually prevents them from participating in the other exercises of the institute.

8. The real, practical work of a Farmers' Institute should not be subordinate to that of entertainment, whether it be of music, song or other exercises.

The value of an institute is measured by the amount of good it produces, rather than the amount of entertainment it furnishes. Stories, anecdotes and illustrations that develop a point or clinch a fact are often the most potent factors in impressing truths upon the mind, but when related merely as a matter of humor, without point or lesson, they become subversive of good, and productive of evil impressions, by diverting the mind from the lessons of instruction, which is the prime purpose of the institute. The same may be said of music, but to a more limited extent. It has its important place in a Farmers' Institute, but should always be subordinate to the real, practical work of the institute. It is seldom necessary to secure music from a distance at great expense and sacrifice. It is an expensive thing that may overshadow the real purpose of the institute. I remember of an institute manager in the Western part of the State who sent to Philadelphia for a lady institute lecturer who was not at all practical, and cost him a large expense bill beyond his appropriation. He paid too dear for his whistle. Just so we can pay too dear for much of our modern music that we can better afford to do without.

9. The amount of music furnished at each session of an institute should be gauged by the character of the work of that session. At a Ladies' Session much more music would be appropriate than at a session devoted to many phases of farm work. My practice has been to have very little singing or music in the forenoon sessions, they being practically devoted to fruit, dairy, general farming and

fertilizing subjects. The afternoons allow a little greater range of subjects, and a little more music. The evenings would not be at all replete without several selections of music.

The more home people I can get interested in assisting with the music, the larger will be the audience, and the better people are pleased. It is a good practice to occasionally ask the audience to join the choir in singing some familiar patriotic song.

If the room is crowded and filled with vitiated air, it is well to rise and sing while the room is being somewhat ventilated by opening doors and windows.

Music has its valued uses at Farmers' Institutes, and should be used and not abused. By its inspiring effects it cheers the speakers and prepares an audience to enjoy and appreciate the solid exercises of the session.

MR. CLARK: I find that there are still four subjects on the program this morning, and I would suggest that we dispense with the discussions, and let the subjects be handled by the parties opening them. If there is time afterwards we can discuss them, but it looks to me as if it was getting too late to do much more than hear the opening speakers.

The CHAIR: We will now take up the next subject, waving discussion until we have completed the program. The next subject is "Who Should Have Charge of Arranging the Program for the Different County Institutes?" to be opened by Mr. George A. Woodside.

WHO SHOULD HAVE CHARGE OF ARRANGING THE PROGRAM AT THE DIFFERENT COUNTY INSTITUTES?

By Geo. A. Woodside, *Sugargrove, Pa.*

I have discovered that the manner of conducting these county institutes, and of arranging for them, is different in our county from what it is in most other counties. The manner in which I work was inaugurated by my predecessor, Mr. R. J. Weld, and we have found it to be the best for our county.

The Institute Manager for the county attends to the making up of the program largely. After the place has been arranged for, and the speakers assigned to us by Mr. Martin, about six weeks before the institute is to be held, I visit each place at which an institute is to be held, usually going there at the time of the Grange meeting. We work very largely there in connection with the Grange, and hold our meetings in their hall, and I go there at the time of their meeting and meet with them, and appoint a local committee at that time. I don't always choose on this local committee men prominent in the Grange; I choose prominent farmers and their wives, outside of the Grange; they like to get on this local committee. After appointing this local committee, I explain to them what I want them to do, and leave with them the bulletin which Mr. Martin sends, giving them a list of the speakers, and ask them to choose such subjects as they may like to hear discussed by the different speakers, and report to me as early as possible these subjects. Then I arrange for the different speakers on the different subjects, making such changes in the program as I see fit, believing I am much better acquainted with the speakers than they are, and that I know better what should go on the program than this local committee. I get my program printed as early as possible, giving a list of the subjects and speakers at the other institutes, and I send these programs broadcast through the country to farmers, getting a list from the assessor and postmaster, and in that way try to reach them all. I think this method of conducting institutes is the best to be found in any state of the Union, with all respect to the managers in other sections. I have attended some institutes in other states, but like ours in Pennsylvania better.

I don't know that I can give you any more information in regard to this matter. That is the way we do it, and I, as county chairman, attend these meetings to see that the program is carried out as nearly as possible as arranged for.

The CHAIR: The next subject, "Should the One-Day Institute be Abandoned?" will now be taken up by Hon. T. J. Philips.

SHOULD THE ONE-DAY INSTITUTE BE ABANDONED?

By Hon. T. J. Philips. *Atglen, Pa.*

I am fully aware that any criticism I may have to make of the work of county managers will be immediately answered by them; but I presume it is open to discussion from the standpoint of the stranger in the community. In quite a number of counties, the one day institute has been in vogue for years. It has been a custom with some of the county managers, and no doubt these men think it is the best way to reach the people in their community. Local conditions in Pennsylvania have much to do with this question.

There are places in Pennsylvania where it is difficult to get from one place to another, which is really nearby. This is a problem that will probably have to be worked out by the people of the several local communities, but if you want my criticism, and this is what I presume you are asking for, I would say that in my judgment, from the little experience I have had, the one-day institute is usually a failure. It is true that in some communities they add to their appropriation by private subscriptions, and hire special speakers and music and they follow each other around from place to place, day after day. Now, the people in Lackawanna county have done this for several years, and it has been successful, but in most other counties where they have tried the one-day institute, it has not been found practicable.

Now, the reasons why the one-day institute fails to accomplish the good that it should, are easily enumerated. One is that it is necessary to have a morning session. In order that a desirable program may be arranged for, it is necessary to have a morning session; these morning sessions are not usually very well attended, and it is often hard for the lecturer to get there from the place he has been speaking the day before. My impression is that it is the two-day session that is productive of the greatest good. There is opportunity in the two-day institute for social intercourse, and for acquiring information that cannot be had in the one-day institute. In my opinion, the greatest good to the farmer comes from the discussion that follows the topic on which the lecturer has spoken. In the one-day session there is not much time for discussions of this sort. Then, too, men and women will come to the speaker between sessions, and ask questions, and become acquainted with him, and in that way carry away impressions that could not be gained in the hurried program of the one-day session. So that on the ground of good work, and of getting and keeping in touch with the men and women whom the Farmers' Institute is to benefit, the Department should, wherever possible, have a two-day session.

Then, too, I believe the greatest good is accomplished by the two-day session for another reason; often a farmer has a certain duty to attend to at a fixed time, and this may be just at a time to interfere with the one-day session, and prevent his attending; if he gives the Farmers' Institute the preference his business suffers, and this, of course, is hardly to be thought of. In the two-day session he has an opportunity to attend at least some of the sessions.

The evening sessions are usually confined to education and home topics, and often the farmer who cannot attend on that particular day of the one-day institute, looks over the program, and says, "Well, I see nothing there to interest me; I guess I won't go," and he stays away; and the institute is not a success because the attendance is small. In the two-day institute this is largely overcome; the day sessions can be devoted to practical topics, and the evening to the entertainment, and yet there will be something to attract the man who can find time to attend but one or two sessions.

Now, I could give you other reasons, but what is the solution? Now, I know full well that in Pennsylvania by reason of the appropriation, some of the counties are entitled to an odd day. Now, in counties that are contiguous to each other, where the county line is only imaginary, why not let the managers of the two counties put their heads together, and combine their odd days, and hold an institute somewhere near the county line, so that both counties can have the benefit of a two-day institute? It could be held, say in Wayne this year, and in Warren next year, for example. What would the county line amount to in that community? Where that is not practical, as it is not, in some counties, why not arrange with our worthy secretary to allow the appropriation to lie over another year, and hold a two-day institute every two years? I don't think there could be any objection to this, and it would be better for the community, and better for the lecturer.

Now, I expect I had better stop right here. A man usually talks too much; but I want to say to our county managers, if you think you must have a one-day meeting, please do not have it in some little town, remote from the railroad, but hold it in some place where it is convenient for the speaker to get to, and to get away to attend the next meeting. One of the worst features of this one-day meeting is that is usually conflicts with the preceding meeting, and also with the succeeding one.

The CHAIR: We will now hear from Brother Northup on "How Can We Make Our Institutes More Helpful to the Farmers."

HOW CAN WE MAKE OUR INSTITUTES MORE HELPFUL TO THE FARMERS?

BY H. W. NORTHUP, *Dalton, Pa.*

I regret very much that I have no paper here to present to you instead of talking to you in this way. I wish I could have given a little more thought to this important topic. When we get up to speak at these institutes, our thought should be "How shall we most benefit the farmer?" That word "most" comes in here, and it makes a material difference in what the proceedings of the meeting shall be. Now, you know that in a horse race, it is the thoroughbred horse that comes out ahead; and it is the boy who makes the least mistakes in his spelling that wins the prize, and it is the little things that help the farmers, and while it may make but little difference to the Department, and to the Secretary of Agriculture in making up the program, it is the things that are to be discussed that are of vital interest to the farmer. They may be topics in which he is vitally interested. It is important to send to a community a man who can interest the people there in the things they grow; in a community devoted to fruit raising, or potato growing, it is of the utmost importance to send a man who can discuss these topics in an interesting way, and give the people the information they need.

Then it makes a material difference how this program is arranged when it is to be presented to a Farmers' Institute. The county chairman should consult his executive committee, and should sit down and study over that program, and select his topics and his speakers with great care; he should be acquainted with the lecturers, and know who will be most capable of filling the position for which he wants them. Get your people interested in the institute; put them on the committees, and see that they take a part, and if you succeed in getting the people interested in the success of the institute it will be a success, and the farmers will be helped.

Another part is the institute lecturers' part. That comes pretty close home, and I tell you, I have felt many times that I was not sufficient for these things. I have felt the responsibility resting on me when I stood up before five or six hundred people and told them about agriculture. It is one of the most important interests in this government, and when I feel the responsibility resting on me as I stand there, I feel like putting into my talk all the energy and all the knowledge I possess. How much is depending upon the institute lecturer! It is something more than merely standing up there and talking to these people. I can't make a nice speech but I can at least show sympathy, so that they can understand it, carry it home. It is a little hard to get acquainted with some of these people; they seem to be sort of afraid of a speaker who comes to them from the department, but I generally manage to make their acquaintance before the institute is over. I come down and shake hands with them, and introduce myself, and pretty soon we are acquainted. They don't introduce each other, but they look at each other and edge a little closer, and by and by they are acquainted. In order to benefit the farmer most, you must get into personal touch with him, and you will pardon me if I refer to myself, and tell you my method of reaching him. Generally, when I get up before an audience, I begin to talk to them something like this: I tell them, "you can see I am a farmer,"—they will take a great deal more from a man who is a farmer, than from one who is not—"nobody ever would take me to be a lawyer or a preacher, or anything but a brewer, perhaps, who consumes a great deal of his own product"; and then I tell them I am from Lackawanna county, in this State; then they will begin to wonder what is your name, and I tell them it is Northup, not Southdown, or any other kind of direction, of even sheep, but just plain Northup, the opposite of Southdown, and then they begin to listen. Once you have secured their attention and made them feel at ease, they will listen to you while you tell them of the soil. And then there is another thing; after the speech is over I get down off the platform and shake hands with them, and ask them about their farms—why not? "We are all the sons of One Man." And these same farmers will come to institute after institute, and take an active interest in them. Why, the Farmers' Institute never had such an opportunity as it has today, and it is not only our duty, but it should be our pleasure to grasp this opportunity to extend to every farmer the benefits that come from the Farmers' Institute. Prof. John Hamilton is sending out from Washington today to get the name of every farmer in the country, to send him the bulletins from the Department of Agriculture, and with such assistance as this, the institute cannot help but be a success.

I don't ask you to follow my plan, and introduce yourselves as I usually do; each one must go about it in his own way, but there will be some way for you to get into touch with these people so that they can be helped, as we want to help them. Put a little vim in what you say, and let the people know that you are there, and you will accomplish your mission, and help the farmer.

The CHAIR: The next subject, in which we are perhaps more interested than in any other, as institute workers, is "Movable Schools of Agriculture," by Director Martin—an indication that our institute work progresses from time to time. Our Secretary is prepared to tell us of the latest improvement in this line.

MOVABLE SCHOOLS OF AGRICULTURE.

By Hon. A. L. Martin, *Director of Institutes.*

My friends, I almost feel loath to take up this particularly important subject at this hour. I am rather inclined to dwell for a longer time upon the topics that we have been discussing this morning. These topics were prepared for the purpose of developing any thought that might aid us in making up the programs for the Farmers' Institutes of the coming year, we are anxious to make use of everything that will help us make them better and of more benefit to the farmers of this great state.

We have in this great State of ours over two hundred and twenty-four thousand cultivated farms, and it is to reach every one of these farmers that the movement referred to in the question assigned to me, was inaugurated. We have large industries of various kinds, in the larger towns; we have great manufacturing plants, but after all, our prosperity is dependent on the farms and the farmers of the State. Have you ever stopped to think how close is the relation between the man in the city and the man out on the farm? I have taken somewhat of a census on that question, and have asked hundreds of audiences and I have found that a large percentage of the dwellers in the city came from the country. If I were to put the question to any average audience, nine-tenths of the people would hold up their hands when asked how many came in from the farm. The boy and girl from the farm represent the warp and woof of the city, and into their character is bred the unswerving character of the farm. They leave the farm, and they leave the village for the city, but the character and strength that they have gained on the farm goes with them. Hence, my friends, the Farmers' Institute, in order to accomplish the greatest good to the greatest number, must not only introduce questions relative to farm life, and farm operations, and the cultivation of the soil, but it must go further and deeper than that. The foundation on which we are built is the cultivation of the intellect of the man, of the boy and girl, and it is to cultivate this and broaden and deepen it that the institute must labor. The education of the boy and girl is one of the greatest questions which the Farmers' Institute has to consider.

Last year Pennsylvania took a somewhat new departure in this matter of education; we instituted, and have held four meetings of what we call the "movable schools of agriculture." One was held in Crawford county, in which we had a four-days' meeting. The success was due to the thoroughness with which this meeting was announced. A local manager was apopinted in the community, who announced to the people the meetings, and the subjects to be discussed by the speakers. They took up dairying and horticulture.

Then we held another one of the same kind in Bradford county, and another in Cambria and another in Lancaster county. Now, the subjects taken up in these schools were prepared in syllabus form and distributed some thirty days before the time of meeting. When the schools came, they found classes prepared for them from twenty-five up to as high as seventy-five. The instructors were experts in dairying, who took up the work of handling the milk, and of handling the dairy, and of ventilation and feed, of the dairy type of cow, of the Babcock test in milk, developing an actual knowledge in the people engaged in this line of work.

Now, my friends, time will not permit us to dwell any longer on this subject further than to say that we are entering upon a time, where, if one of these schools is desired we can furnish you instructors versed in scientific investigation of his subject, to teach these classes, taking four days from your regular institute course for this purpose. We have at present three subjects; the first is dairying; the second is horticulture, and the third, poultry. Now, my friends, while we are carrying on more varied industries than any state in the Union, these are the three leading agricultural industries, and for this reason we have selected them as the first three on the schedule.

There is one other question that I want to take a minute to inquire about, and that is in relation to the Pennsylvania State College and Experiment Station. We have at the college a corps of instructors in agriculture that is second to none in the country, and we are devising ways and means by which they may join in with this department in advancing this great cause of agriculture. Beginning the 30th of December of this year, the college will have another "Farmers' Week," and all the farmers of the State are invited to attend this meeting. A special course of instruction is now being prepared, and you will have an opportunity to visit the Experiment Station and see what is being done for the development of agriculture in the State. There will be lectures in the various departments by men specially qualified for the work, and I would like every one of my institute lecturers to embrace this opportunity, if possible of getting into touch with the work at State College, and getting the benefit of the lectures by these scientists, for one or two or three or four days, so that they may go forth to their great work better equipped. We will use enough of the funds at our disposal to pay the railroad fares of the lecturers to and from State College, and I wish as many of you as can will endeavor to avail yourselves of this opportunity would raise their hands. It appears to be unanimous; I thank you, my friends. Now, will Mr. Agee please tell us a little more about this subject?

MR. AGEE: In the name of Dr. Hunt, the Dean of our School of Agriculture, I want to extend to every instructor here a hearty invitation to our "Farmers' Week," and also to the farmers and friends who are here. Last year, when we inaugurated the movement, we had between three and four hundred there, for the eight days' work, representing two-thirds of the counties in the State.

This year we expect to double that number. These sessions will be held during your vacation, thus enabling you to go back to your institute work without losing any time. If you will accept Mr. Martin's suggestion, and come to us the first four days of "Farmers' Week," you will find three lectures going on for every period of the day, so that you can select the one in which you are interested. These lectures will be given by men who are recognized as authorities in their fields. The idea is to make every hour count. A committee will meet you on your arrival at College, and you will be given a room. State College is not a large place, but we can house and feed all of you who come; we have one dining hall in which nine hundred men can be seated. I hope you will give us three or four days of your vacation, and go back to your work with new enthusiasm.

SECRETARY MARTIN: Just a word to the County Chairmen. I trust that none of you will feel that this is slighting the county chairmen in any way; if our funds permitted, I should be glad to give you the benefit of this course at State College as well as the lecturers; since it cannot be both, I have selected the lecturers in order that they may go out better equipped to minister to the people whom we represent. We would be very glad, indeed, to have every county chairman present with us, and only regret that the funds at our disposal are not sufficient to defray their expenses.

MR. McCREARY: I want to call attention to the trip to the Park this afternoon; the trolley company will have cars in front of the Leslie House at four o'clock this afternoon, and we are all cordially invited to take this little pleasure trip.

The CHAIR: Prof. Van Norman has a word to say.

PROF. VAN. NORMAN: I simply want to supplement Prof. Agee's invitation to our Farmers' Week, and to say to the men that they shall bring their wives and friends along; we have made provision to interest the ladies. If they come I think they will find something there to interest them. It is only due to the women of Pennsylvania to include them in our arrangements. If it were not for their interest and co-operation, our Farmers' Institutes would not be the success they are today, and we want them to extend that interest and help us improve them still further; so we want them to come with you to State College during our next "Farmers' Week."

The CHAIR: The session now stands adjourned until half past one this afternoon.

New Castle, Pa., Thursday Afternoon,
1.30 P. M., May 26, 1908.

SECRETARY MARTIN: Mr. Blyholder, who was to have occupied the Chair this afternoon, has been detained by sickness in the family, and is unable to be present. I will therefore ask Prof. Alva Agee to introduce the first speaker of the afternoon, Dr. Thorne, of the Ohio Experiment Station, who will talk to us on "Barnyard Manure; Its Treatment and Application to the Soil."

PROF. AGEE: I was glad when Director Martin asked me to address you for a few minutes, in order that I might introduce the speaker of the afternoon. I have become a Pennsylvanian, and I am proud of Pennsylvania, but I do not forget that the greatest soil experiment in the country is being conducted in my native state. This is due to the fact that it has the conditions necessary for doing such work. The big farm at Wooster, Ohio, contains a large acreage adapted to the work, and we have as Director there one of the great experts of the United States on the question of soil fertility. Each station has its own line of work. The Ohio station stands first in the matter of soil experiments, just as the Pennsylvania Station is first in animal nutrition. It is my privilege to introduce to you this afternoon my friend, Director Thorne, who will speak to us on "Barnyard Manure; Its Treatment and Application to the Soil," one of the problems being worked out at the Ohio Experiment Station.

BARNYARD MANURE: ITS TREATMENT AND APPLICATION TO THE SOIL.

BY PROF. CHAS. E. THORNE, *Wooster, Ohio.*

It gives me great pleasure to meet the farmers of Pennsylvania in this manner, although I must say that Ohio has a serious grudge against Pennsylvania just now, for having taken away our Mr. Agee, who has been so very helpful to us for many years in the upbuilding of our agriculture—a man whom we could most illy afford to lose.

As Mr. Agee says, the Ohio Experiment Station has been very favorably situated for the study of soil fertility. It has had a privilege which very few stations have had, of selecting the soil for its work after having had for ten years the opportunity of learning how to experiment—a privilege which has given a greater chance of success than is possible under the conditions in which many other experiment stations are situated, most of them having located without reference to the study of the soil.

For 20 years I have been trying to persuade the farmers of Ohio that they are leaning too heavily on the commercial fertilizer in the endeavor to maintain the fertility of their fields. I grew up under the old conditions, before commercial fertilizers were known, and with the old fashioned idea that there is no method of maintaining fertility so economically as by the feeding of animals and returning their manure to the soil, but when I advocate this system in Ohio I am met with the reply that it is impossible to keep enough livestock for this purpose. I have never believed that this reply was well supported. I believed that it was a case of would not, instead of could not, but have not had the facts available with which to sustain my position until within a very recent period. But now we feel that we are getting solid ground under our feet in this respect, and a factor which has contributed much to this result is the experiment started at your own State College about 25 years ago,—an experiment admirably planned, and which is now yielding results of incomputable value. But no single experiment is sufficient to solve the problems of soil fertility for an entire state. Soils vary widely in character, according to their origin and management, and the only way in which the different types of soil can be effectively studied is to go into the field and study them there. The laboratories of the physicist, chemist and biologist are indispensable to a thorough knowledge of the soil, but they can never take the place of the field: and yet it is only within the last quarter of a century that any systematic attempt at the field study of the soil has been undertaken, excepting at the great pioneer experiment station of Rothamsted.

The commercial fertilizer is an outgrowth of chemical investigation, and abundant field experience has confirmed the chemist's announcement that this fertilizer may be substituted for the manure of the farm, but when we count up the cost of making in chemicals a complete substitution for farm manure we find that too meager a margin is left for profit.

The Ohio Experiment Station has carried on several series of experiments in the use of fertilizers and manures on crops grown in systematic rotations. In one of these experiments, located on the farm of the main station at Wooster, on a soil peculiarly responsive to the action of fertilizers and manure, there has been produced, from one of the treatments, a 14-year average increase to the value of about eight dollars and a half per acre annually in a rotation of corn, oats, wheat, clover and timothy. The cost of the fertilizer producing this increase has amounted to $23.00 for each 5-year rotation, or a little more than four dollars and a half annually, thus leaving a net profit of four dollars per acre, or enough to pay the rental of the land. I know of no similar test in which results equal to this have been attained for so long a period. But on the same farm stable manure, used on a rotation of corn, wheat and clover, at the rate of eight tons per acre every three years, has produced increase to the value of more than twelve dollars annually, or more than four dollars and a half for each ton of manure. In other words, eight tons of manure has produced an increase greater by 50 per cent. than that obtained from a fertilizer costing $23.

It is true that manure is not always produced without cost, but the expert feeder expects that in the average the increase in value of the animal fed will pay for the feed and care, leaving the manure free of cost. And this very fact that the manure is looked upon as a product that has cost nothing, leads to neglect in its management, so that a very large proportion of the manure produced on our farms is lost before it ever reaches the field.

We feed in Ohio a great many cattle that are brought in from the West to be fattened on our corn. These cattle are usually fed in open feed-lots and the manure accumulates in great piles, entirely exposed to the weather. We have found it very hard to convince our farmers that manure exposed in this way suffers very serious loss. They see but a comparatively small reduction in the size of the heap; they see no brown colored stream running from it, and they think that they have as much material to haul to the field as has the man who feeds under shelter; and often they are right, so far as the mere bulk of this material is concerned.

In order to investigate the losses which may occur in manure exposed in this manner, we have at several times put out weighed lots of manure at the beginning of winter, sampling and anaylzing them when put out, and weighing, sampling and analyzing the residue found in the spring.

Sometimes we have taken up more pounds of manure in April than we had put out in January, but when we take the manure to the laboratory the chemist tells us that it has lost from one-third to one-half its fertilizing value, in the nitrogen, phosphorus and potassium which have been leached out and replaced by water from the clouds.

The accompanying table gives the results of an experiment in which several lots of manure, of 1,000 pounds each, were treated with various preservative or re-enforcing materials and then exposed to the weather from January till April.

TABLE 1—The Waste of Manure.

Treatment.	Nitrogen.		Phosphorus.		Potassium.		Value.
	Total.	Water sol.	Total.	Water sol.	Total.	Water sol.	
Untreated:							
Pounds in January,	10.30	3.36	3.24	1.66	8.14	8.14	$2 05
Pounds in April,	7.18	1.14	2.47	1.26	3.35	2.84	1 30
Per cent. loss,	30	66	24	24	59	65	37
Gypsum:							
Pounds in January,	9.68	2.12	2.76	.78	7.86	7.86	1 92
Pounds in April,	7.94	1.46	2.66	.75	2.56	2.49	1 36
Per cent. loss,	18	31	4	4	67	68	28
Kainit:							
Pounds in January,	9.76	3.14	2.88	1.36	10.70	10.66	2 11
Pounds in April,	6.68	.31	2.48	1.31	4.98	4.96	1 34
Per cent. loss,	32	90	14	4	53	53	36
Floats:							
Pounds in January,	10.70	4.28	8.60	1.52	7.38	6.58	2 39
Pounds in April,	7.43	1.06	7.57	1.32	3.52	3.47	1 70
Per cent. loss,	30	75	12	13	52	47	29
Acid Phosphate:							
Pounds in January,	9.86	3.04	5.70	2.28	6.88	6.88	2 09
Pounds in April,	7.18	.84	4.79	1.51	2.99	2.51	1 44
Per cent. loss,	27	72	16	34	57	63	31

The table shows that there has been a great loss in all the fertilizing constituents, and especially in the most valuable part—that already soluble in water. Of the various materials used for treatment, gypsum is the only one which has shown any marked effect in reducing the losses, and this in the nitrogen and phosphorus; the potassium shows an even greater loss in the gypsum-treated lot than in any of the others. Some may ask the question whether these findings of the chemist would be verified by actual test in the field, and an answer to this question has been sought by a series of field experiments, begun at the Ohio Station in 1897, and still in progress.

In these experiments two lots of manure, the one taken from the open barnyard, where it has lain for several months, the other taken fresh from the stable, and spread on plots lying side by side at the rate of 8 tons per acre and plowed under for corn, the corn being followed by wheat and that by clover in a 3-year rotation. Three tracts of land are included in the test, so that each crop is represented every season. At the same time four other pairs of plots are dressed with manures of the same kind and applied in the same quantity, the only difference in treatment being that the manures for one pair of plots are mixed with the finely ground phosphatic rock from which acid phosphate is made, and which is known in the South as floats; for a second pair the manures are mixed with acid phosphate; for a third pair with the crude potash salt called kainit, and four a fourth pair with gypsum or land plaster, these materials being used in all cases at the rate of 40 pounds per ton of manure.

TABLE 2—Reinforcement of Manure.
11 Years' Average Result.

Manure and Treatment.	Yield per Acre.			Net Value of Increase.	
	Corn—Bus.	Wheat—Bus.	Hay—Lbs.	Per acre.	Per ton—Manure.
No manure nor fertilizer,	34.6	10.4	2,009	....	....
Yard, untreated,	50.6	18.2	635	$18 17	$2 27
Stall, untreated,	58.2	19.7	1,191	24 73	3 09
Yard, with gypsum,	57.7	22.9	902	23 29	2 91
Stall, with gypsum,	60.6	22.9	1,164	27 60	3 45
Yard, with kainit,	54.2	20.9	1,098	22 70	2 84
Stall, with kainit,	60.1	23.0	1,791	30 00	3 75
Yard, with floats,	58.8	24.2	1,394	27 34	3 42
Stall, with floats,	63.0	25.8	2,325	35 67	4 46
Yard, with acid phosphate,	59.6	24.6	1,666	30 65	3 83
Stall, with acid phosphate,	64.5	25.5	2,470	37 31	4 66
Commercial fertilizer, 200 lbs.,	43.3	14.4	703	8 38	....

Valuations.		Cost of Treatment.	
Corn,	$0 40 per bu.	Gypsum,	$1 00 per acre.
Wheat,	80 per bu.	Kainit,	2 40 per acre.
Hay,	8 00 per ton.	Floats,	1 36 per acre.
Stover,	3 00 per ton.	Acid phosphate,	2 40 per acre.
Straw,	2 00 per ton.	Fertilizer,	2 25 per acre.

The outcome of this work is given in Table 2, which shows that in every case the fresh manure has produced a larger increase of crop than the yard manure, the average difference in value between the produce of the two kinds of manure being 83 cents per ton of manure, which is 21 per cent. of the value of the increase produced by the fresh manure. This is a somewhat smaller difference than the chemist has found, if we assume that the ton of fresh manure has in the average produced a ton of yard manure; but this assumption would undoubtedly be incorrect, for while, as I have stated, the manure sometimes weighs more when taken up in the spring than when put out in the fall, this is the exception, rather than the rule, and in the general average there is loss in weight, as well as in composition, so that there can be no doubt that the field results are fully supporting those of the laboratory.

Letting this point pass, however, and assuming that we have had a ton of manure to haul out of the barnyard for every ton thrown into it, we find that in the case of the untreated manures we have lost six dollars and a half per acre by throwing the manure into the barnyard, instead of hauling it directly to the field, while with the treated manures the loss has been still greater than this.

Each of the materials used in treating the manure has greatly increased its effectiveness, but the increase for the phosphatic materials has been so much greater than that for the gypsum or kainit, that it has been relatively unprofitable to use these; and as between the two carriers of phosphorus, the acid phosphate, though costing much more than the floats, and carrying only half as much phosphorus, has been the more profitable material to use. This is probably due to the action of the sulphuric acid in the acid phosphate in conserving the ammonia of the manure. This test is being conducted on a very acid soil, one on which it has become absolutely necessary to apply lime in order to grow clover, and although the use of acid phosphate undoubtedly increases the acidity of such a soil, yet since we must use lime anyhow, the additional quantity of lime required to neutralize the acid phosphate is so small that it becomes a negligible matter.

As an illustration of the ease with which the exposed heap may be deprived of its value, I would recall to the memory of the older members of my audience the method by which potash was obtained for soap making in the pioneer days when wood was a more common fuel than at present: The ashes were placed in a V-shaped hopper, the point resting in a trough—often one cut in a log—and water was poured on top as long as the brown stream flowing from the bottom would float an egg, each bucketful of clear water taking the place of a bucketful of lye; but when the work was done the ashes, though now worthless as a source of potash, were heavier than at the start. But it is easier to leach the potash out of the manure heap than out of the ash hopper, for in the manure heap a considerable portion of it is already in solution, only waiting to be displaced by rain.

A common mistake in the use of manure has been the application of too large doses. This point is brought out by the experiments at your State College Experiment Station, in which manure has been applied twice during each rotation at the rate of six, eight and ten tons per acre for each application to different plots, with the result that the six-ton dressing has produced increase during the first 20 years of the test to the value of $20.54, the eight-ton to that of $21.08, and the ten-ton to that of $22.28, using the same prices for produce employed in computing Table 2. In a similar experiment at the Ohio station manure has been used twice during each rotation at the rates of four and eight tons, and has produced increase to the average value of $21.00 per acre for the 4-ton application, or $2.62 per ton of manure, and of $33.15 for the 8-ton dressing, or of $2.07 per ton of manure. While the soil at the Ohio station has been more responsive to manuring than that at State College, yet the same general rule holds good, that the larger applications are relatively less effective than smaller ones.

In the ripening of our cereal crops about three-fourths of the phosphorus passes into the grain, while about three-fourths of the potassium remains in the straw; hence the system of farming under which the grain is shipped away and the straw is kept at home results in a much larger draft upon the soil stores of phosphorus than of potassium. In the growth of live-stock; also, there is a large consumption of phosphorus for bone formation, whereas almost no potassium is called for. Again, when milk is sold off the farm it carries with it a relatively large proportion of phosphorus; in fact, it is only when the straw goes to the paper mill and the hay to the city that the draft of potassium begins to keep pace with that of phosphorus in ordinary farming. In truck farming, of course, the conditions are reversed. This explains why our fields, which have been long in cultivation, show such a hunger for phosphorus, and also shows us that manure cannot be a well balanced fertilizer for such soils. Our experiments indicate that for phosphorus-hungry soils the effectiveness of manure may be nearly doubled by re-enforcing it with a carrier of phosphorus; in fact, as between the manure taken without treatment from an open barnyard and that taken fresh from the stable and re-enforced with phosphorus, the effect has been more than doubled.

This point is strikingly illustrated in the long-continued experiments with fertilizers at your own experiment station and in all these conducted by the Ohio station: When the fertilizer contains nitrogen and potassium, but no phosphorus is added, the quantities of nitrogen and potassium remaining as before, the loss is invariably turned to gain. Manure carries nitrogen and potassium in superabundance, as compared with phosphorus, and under the conditions of the average farmer it is used wastefully unless re-enforce with this all-important element.

DR. DETRICH: What do you feed to produce the stable manure?

PROF. THORNE: Wheat bran and corn meal have been the basis of our ration for many years.

MR. SEEDS: How many pounds of acid phosphate do you use?

PROF. THORNE: Forty pounds of acid phosphate, or forty pounds of floats to one ton of manure. We have had such excellent returns from that proportion that we are inclined to recommend it.

MR. SEEDS: And you say the barnyard manure is more deficient in fertilizing matter than the stable manure?

PROF. THORNE: Yes; for the reason I have given you.

MR. STOUT: I would like an explanation of just one thing. The Professor tells us that we lose some very important elements in the manure by washing out. Now, if we take the same amount of manure from the stables every day and spread it out in the fields, how much will we lose by spreading it in that way?

PROF. THORNE: We have no positive proof either way, but our opinion is that you would lose very much less by spreading it in this way than by leaving it in the barnyard. At our Experiment Station we fed 30 steers on an earth floor, in a stable, under shelter.

At the same time we fed 28 more in the same way on a cement floor; we fed these steers for six months. We weighed and analyzed the manure in both cases, making four sets of analysis, and we found that in six months time we lost enough fertility on the earth floor to pay half the cost of cementing the floor. Dr. Frear has made some interesting experiments at your own station between manure thrown out of the stable daily, and manure tramped under foot and left until ready to draw it to the field. In the manure thrown out daily there was a heavy loss of fertilizing constituents, while in that trampled under foot the loss was insignificant.

DR. DETRICH: At what intervals was the phosphate applied?

PROF. THORNE: In the cow stables, every day: under fattening steers, two or three times a week.

DR. DETRICH: Is the manure applied once in two years, or once in three?

PROF. THORNE: Once in three years, plowed in for corn. We have grown corn, wheat and clover, in a three-year rotation and have made an increase of twenty bushels of corn; that is, we get a total yield of sixty-five bushels of corn to the acre, for eight tons of manure, applied directly from the stable.

MR. COOK: Do you mean eight tons a year?

PROF THORNE: No, eight tons every three years—two and two-thirds tons a year. When we have taken the manure from the yard our results have not been quite as good.

MR. CLARK: I would like to ask this question: in increasing the amount of bushels of wheat by means of manure, have you increased the gluten in the wheat?

PROF. THORNE: We are not ready to answer that question; we are taking it up experimentally, but we are not yet ready to answer the question.

MR. SEEDS: When you use forty pounds of acid phosphate that would, I suppose, be worth twenty-five cents; now, I notice you increase the value of the fresh manure from $3.09 to $4.66; what I want to get at is, where does the twenty-five cents come in in those figures?

PROF. THORNE: You will notice that the table gives the net value of the increase, meaning that the cost of treatment has been deducted from the total value.

MR. PHILIPS: You speak of a three and a five years' rotation, but you do not make it clear to my mind whether in the five years' rotation, you make one application of manure to the corn and one to the wheat, or only one application to both.

PROF. THORNE: Two; one to the corn and one to the wheat.

MR. BAYARD: In the western part of the State, fifteen to twenty per cent. of the farms are in clover, and the rest have passed to meadow. In what quantity should we apply to the grass land?

PROF. THORNE: We are not ready from our own experience to recommend the use of floats in that way. Dr. Hopkins, I know, does, but we are getting in this experiment so much better returns from the acid phosphate that we hesitate to recommend the use of floats. In our regular farming we use the acid phosphate.

MR. BAYARD: On meadow land?

PROF. THORNE: Yes.

MR. BAYARD: How much would you use on blue grass pasture?

PROF. THORNE: Our experience has been that it pays to be liberal. Possibly our mistake in using floats has been that we did not use it in large enough quantities, but when floats costs, as it does in Ohio, nine dollars a ton, and you can buy the acid phosphate for fifty per cent. more, it has been our experience that it is cheaper to use the acid phosphate.

A Member: Would you use acid phosphate rather than lime?

PROF. THORNE: Acid phosphate and lime cannot be substituted for each other. Each has a different work to perform, and each will accomplish its work more effectively if the other is also at work.

A Member: I wonder whether the Professor can tell us the relative loss in manure over summer under cover?

PROF. THORNE: That depends on how it is kept. You may keep it under cover in such a way as to lose everything, and you may keep it in such a way as to lose almost nothing. If we keep it wet, we may keep it so as to lose practically nothing, but if it is allowed to become partially dry, practically its whole virtue will be lost. It is very important that it should be kept thoroughly moist while under cover.

MR. WOODSIDE: Is it desirable to use a manure shed?

PROF. THORNE: A manure shed should be used with discretion. I believe that the proper way to handle manure is to get it at once from the stable to the field; but there will be days when this cannot be done, and for such days a manure shed is an excellent protection, if the manure can be kept moist.

MR. WOODSIDE: Would it be advisable to have this shed with a cement floor?

PROF. THORNE: Yes, sir.

MR. WOODSIDE: And would it be advisable, also, to have a cesspool in the manure shed, and pipe the water in it?

PROF. THORNE: This is what I am trying to persuade our people to do.

DR. CONARD: How long is that manure applied before you plow for corn?

PROF. THORNE: In our experiments we have applied it only a short time before—say two or three weeks, but in our field practice we have taken the manure and spread it as soon as the clover was taken off, and we find that the earlier it is done, the greater the effect is.

MR. GOODERHAM: Up in Cambria county we are up against hill-sides; we keep our manure under cover, banked up against the hillside; should we have a cement floor to keep it moist?

PROF. THORNE: Yes, sir.

MR. CLARK: Now, let me ask you, to what depth do you plow?

PROF. THORNE: About eight inches deep.

MR. KESTER: Have you any experience in applying manure to grass land the year previous, and then plowing it down for corn?

PROF. THORNE: We have not, except that we apply to clover sod the fall and winter before plowing it for corn.

MR. McCREARY: This manure question is a great big question; I have been studying it for many years, and it seems to me that usually when people begin to talk about manure, there is one thing that is not given proper consideration, and that is the kind of soil the manure is used on. Now, I have a clay farm, and it has been my practice to plow the manure down for wheat for fifty years, but we don't need any manure for corn. I have grown two hundred bushels of corn to the acre, without any manure. Our experience is that there is a great difference between the soil in the fields. You take our soil and you lime it and plow it for clover, and give it a little top dressing, and when you plow it again you will have clover roots nine inches deep, and then you turn this up for corn, and you don't need any manure. When you plow it up for corn four or five years afterwards you will find old, rotten manure. You don't need any manure. Now, I can show you another farm, and I know that there has not been a pound of manure on that farm for thirty years; it has all been top dressed, and the soil is so mellow that you can see the wagon tracks in the fields where the soil has been spread. Now, these manure experts should take into consideration the different kinds of land; you take a sandy bottom piece, and you put it on top, and when you come to plow it down, you will find it has all been leached away, but for a hard clay, a top dressing is best.

MR. AGEE: Here in New Castle we can find at least one farmer whose practice is all right for his land.

PROF. THORNE: We have been trying both top dressing and plowing it in, and we find that it depends very largely upon how we plow it in. In our 5-year rotation we have been top dressing for wheat, because on our soil we find the grass seeding following the wheat has been benefitted. In the 3-year rotation the wheat following the corn, we find that the wheat is coming up to about as large a yield as we can expect, but even in this short rotation we think we might get a little better results if we used a little phosphate with the wheat.

A Member: A little potash would be all right, also, would it not?

PROF. THORNE: For some soils, but it is not always needed.

MR. BILLINGS: In our locality we rotate corn and wheat and hay, and we have grown oats and hay; when we have a field we want to put in hay, we top dress it and plow in the corn stubble.

PROF. THORNE: Your soil is sandy?

MR. BILINGS: No, sir; a clean, hard-pan soil, and we plow from six to nine inches deep.

PROF. THORNE: If the land is level I can't see much difference between plowing the corn stubble in the fall and allowing it to stand as it is, because in either case, there would be a slight washing away, but on hilly land fall plowing increases the tendency to wash.

MR. BILLINGS: We find it is in better condition in the spring to plow down and top dress for oats.

The CHAIR: I regret very much to be obliged to bring this interesting discussion to a close, but our time is becoming limited, and we will have to take up the next topic on the program—an address by Prof. Van Norman on "The Growing Demand for Wholesome Milk." Prof. Van Norman needs no introduction to the dairying interests of this State, for which he has done so much.

Prof. Van Norman's paper is as follows:

THE GROWING DEMAND FOR WHOLESOME MILK.

By PROF. H. E. VAN NORMAN, *State College, Pa.*

The development of our great centres of population has been accompanied by the appearance of many complex problems to vex, annoy and threaten the life of the city dweller, especially that of babes. Realizing that a high toll is annually paid the Grim Reaper from babes under two years of age, the medical profession has for years sought to learn and lessen the cause.

The milk supply is unfortunately in too many cases the probable messenger of death. While admitting that this is true, I feel that other factors, such as the lessened vigor inherited from parents weakened by their life in crowded cities, lack of bodily exercise and out door air, should be charged with some of the responsibility. Milk is certainly not the only cause of the high mortality, if it is the only food of many babes.

In place of the family cow, and the milkman who kept his cows near enough town so he could drive in and distribute the milk from his own herd direct to his customers, has come the milk peddler, who may be an irresponsible fellow buying a little milk from some shipper or wholesaler, or it may be the driver for some great company having hundreds or thousands of shippers scattered from a few miles to several hundred miles from the city. New York gets some of its milk as far as 400 miles away, Pittsburg has gone as far as Cleveland, Columbus, Chicago and Philadelphia when short from sources nearer at hand.

The condition created by the necessity of shipping so far have developed and added faults that were not known when the "milk man" was the fellow who owned the cows and peddled the milk from them. The danger in milk, even for infants, is not primarily the ordinary souring due to lactic acid producing bacteria, but rather to other forms and the products of their growth.

The real danger which may be in milk are: preservatives, a polite name for poisons; the germs of such diseases as typhoid fever, scarlet fever, tuberculosis, and infant intestinal disorders; the germs which in the process of their growth develop products that are injurious to the delicate stomach of the infant or invalid, uncleanliness and pasteurization.

Taking these one by one: Preservatives have been resorted to by the ignorant and unscrupulous, but thanks to the activity of the city boards of health this danger has been reduced to a minimum in most of our large cities.

Disease-Producing Bacteria: Fortunately the danger from this source is occasional rather than constant (excepting possibly tuberculosis) though very real when it does exist. It is reported that there were 368 cases of typhoid fever in the homes served by one milk man, while there were 8 of cases who got their milk from a man who also sold milk to the man whose customers had so many cases. Similar records are available relative to the carrying of scarlet fever, differing only in the number of cases. In another instance milk was sold from a farm, where there was a case of diphtheria, to two men who peddled it in three towns among people who got milk from the infected farm, while there were only three cases in the homes served by the other five milk men.

These instances are sufficient to show that the milk may be the carrier of those diseases, and to suggest the responsibility that rests on him who would supply milk to the public.

Tuberculosis: As yet there is difference of opinion among medical men as to the danger of transmitting tuberculosis to man by the use of milk from infected cows. The British Royal Commission appointed to investigate this subject has reported, after several years' study, that in its opinion it has found some unmistakable evidence that certain cases of tuberculosis were transmitted from the milk used. As long as there is uncertainty in the matter the milk consumer naturally desires to be on the safe side and wants milk preferably from cows known to be free from the disease, or milk from which the possibility of infection has been removed by efficient Pasteurization.

Products of Bacterial Growth: Changes commonly called souring inevitably and unavoidable occur in milk and practically all of them are directly or indirectly the result of bacterial growth. As a result of this growth many products are formed, lactic acid, gas, toxins. color, bitter flavor, etc. Under favorable conditions the chief of these is lactic acid, which is not objectionable except when we want sweet milk. It is the normal souring. Along with the bacteria which bring about this result, many others gain access to the milk and the products of their growth may be objectionable or positively injurious, especially where milk is held several days at low temperatures under ordinary conditions of cleanliness or uncleanliness. Where milk is Pasteurized and held several days there may also be products that are objectionable.

Certain forms which are more or less closely associated with the intestinal track of the cow may be introduced into the milk through particles of manure that get in during the milking process. Even though these particles or at least the undissolved portion of them are strained out the milk has been seeded with bacteria which may cause intestinal disturbances in children to whom it is fed.

The diarrhea of the milk fed infant is very frequently due to the presence of these bacteria or the toxic (poisonous) products of bacterial growth.

it is an unmistakable evidence that the above statements are true which has started and is developing the interest in the character of the city milk supply. Meetings to discuss the subject are being held. Milk Commissioners are being created by the medical societies in many cities and the daily press is giving attention to the subject. The truth was first brought home to the medical men in their efforts to learn the cause of the high death rate among city babies necessarily depending on milk as a food. Not only have these investigations shown the above conditions but they have shown that much milk used in some of our cities is produced in barns, especially within the city limits, that are in such condition of filth and lack of fresh air that cows cannot possibly be healthy, to say nothing of the filthy floors and flanks of the animals and air so ladened with fumes of rotting material that milk cannot possibly be drawn through it into a pail without absorbing gases that impair its quality and shorten the period of usefulness, if not making it positively a menace to the life of the user.

In other cases milk is delivered to shipping stations, say for sake of illustration, on Tuesday evening, the cans are placed in cold water and held till Thursday morning (Wednesday's delivery being similarly held) Thursday morning all of this milk is placed in milk cars and shipped to the city, reaching there Thursday night, Friday this milk is distributed to the consumer who expects to hold some of it for breakfast Saturday morning, or to feed the baby Friday night and Saturday morning. Thus some of this milk is 72 hours old before it is finally used.

If the conditions have been thoroughly sanitary from the process of milking through, this milk may be considered sweet when used, if on the other hand there has been neglect there is frequently the formation of products by bacteria which thrive at low temperature that are positively injurious to the delicate stomach. If some of this milk instead of being delivered in sanitary bottles, goes into a little store in a crowded section of a great city, is dumped into a can that may or may not have been washed, is frequently exposed to the air of the store reaking with the odors and fumes from a heterogeneous collection of groceries, vegetables and meats and the dust from the street and the stream of customers, dust that is laden with bacteria and rarely free from those of tuberculosis and various skin diseases if nothing worse, is it any wonder that such milk becomes positively dangerous as a food?

Unfortunately milk is of such a character that the average consumer is usually ignorant of this possibility and does not suspect the dangers that are so easily carried, all of which makes it a hard problem to educate them. Many who get good milk feel that the things said about the milk supply are gross exaggerations by Yellow Journalists. While this may be true sometimes, there is so much foundation in fact that to-day the public is aroused in many cities as never before and we have a demand for certified milk, which is nothing more or less than a clean cold raw milk from healthy cows fed on wholesome foods. Milk which a disinterested party represented by the Medical Milk Commission certifies to the consumer is as represented and has been produced under the conditions claimed for it. To the expense necessary for the production of such milk must be added the considerable expense of the disinterested supervision and certification making it a very expensive milk, so much so that it will always remain a comparatively small percentage of the total milk consumed in any community.

What then is essential to the production of milk for the masses? I believe, first: continuation of the educational campaign till the more intelligent users of milk become aggressively interested in having a knowledge of the character of their milk supply and the realization of the great difference that may exist in the character and quality of the milk. When this is reached they will make such inquiries of their milk man as will force him to recognize the difference. With this realization will also come a willingness to differentiate in the price. Good milk should command a little higher price than it ordinarily does and the poor milk should command considerably less or be eventually excluded from the market.

In my judgment no amount of law alone is going to bring about the model milk supply. Education must be a part of any successful effort.

The vital things in the production of a wholesome milk are, in my judgment, the following:

Given healthy cows, wholesome food and healthy attendance.

First: The flanks, udders and adjacent parts of the cow must be clean, free from adhering manure, loose hairs, etc. While not absolutely necessary, the clipping of these parts will make it much easier to keep them clean.

Second: The air of the stable must be free from the dust incident to the incoming cows, to the grooming of the cows and to the moving of bedding, hay or grain. This may be secured by seeing that those operations take place long enough before milking to allow the dust to settle. There should be such ventilation,—that is, real change of air, not simply so called ventilators which may or may not work, —as will change the air and remove the gases characteristic of the stable and which will be more or less absorbed by the milk passing through them from the udder to milk pail, if present.

Third: The use of a small top or strainer top milk pail with opening held as near the udder as is practical.

Fourth: Absolutely clean hands on the part of the milker and clothing free from dust which may be scattered in the air by the movements of the milker.

Fifth: The removal of the milk from the stable atmosphere and cooling to a temperature as near 45 degrees or lower as possible, within a short time after milking.

Sixth: That method of bottling and handling which gets the milk to the consumer with the fewest possible exposures to the air and preferably not over 24 hours from the time it is drawn from the cow, having in the meantime been kept cold and not exposed to the air.

Whitewashed ceilings, varnished walls, cement floors, iron stalls, white uniformed milkers, expensive apparatus for cooling, stone milk houses, etc., may all be used in the securing of this kind of milk. They may create an atmosphere and an *esprit de' corps*, which makes it easier to secure milk of this quality, but after all is said and done they alone will not secure it; on the other hand the absence of all of these fittings but the efficient compliance with the conditions I have named may secure a wholesome product without any of them, though more effort will the required.

The one thing that is essential in addition to what I have named is moral integrity and a little knowledge of the why of these things, with sufficient nerve and push to comply with the conditions twice a day, 365 days in the year, without the arm of the law poised threateningly over the milk producer and handler.

I cannot leave this subject without a further word on pasteurization, that excuse or substitute for what ought to have been done. While there is no question that the clean, cold, raw, fresh milk is very much better than any milk Pasteurized under most conditions, it is nevertheless true that efficiently Pasteurized milk under some conditions is the lesser of two evils. The objection to it is that in many cases it is used as a shield for carelessness, uncleanliness, and even positive filthiness. It is all too common to run the milk through a so-called Pasteurizer and assure efficient Pasteurization. Many times I have asked the operator "what temperature do you Pasteurize at?" after receiving his aswer I have looked at his thermometer and found his practice to 5 to 10 degrees below his statement. Thus has he depended on the Pasteurizer to do certain things, or to in part atone for things left undone; and then the Pasteurization is so conducted as to fail to do what it might have done or what it was right to expect it to have done.

Efficient Pasteurization should heat the milk to a temperature of 163 degrees at least and preferably should hold it there for ten minutes, while there are material advantages in heating it to a lower temperature for a longer time. The commercial difficulties have not made this practice general though one establishment I know of heats to 145 degrees for one-half hour, and once a week ships 2,000 gallons of this milk from New York to the Isthmus of Panama, where it is used during the ensuing week. In this case, however, only the best milk is used for Pasteurization.

Carelessness in the ordinary practice of Pasteurization has brought disrepute on commercially Pasteurized milk and some way must be found to require it properly done or the law must forbid it, as poorly done the user is relying on false security.

Finally, the best milk is the clean cold raw milk. It can be produced under conditions and at an expense that leaves it within the reach of the great mass of milk consumers, at a fair margin to the producer who uses business methods, studies his cows and has good ones.

A Member: Would it not be well to instruct the consumer to take care of milk after we get it there?

PROF. VAN NORMAN: The consumer has got to learn that; it will come as a part of the education. I have seen some very dirty vessels brought out to put the milk in; people will let a pitcher stand for twelve or twenty-four hours, and let the milk get sour in it, and then they will rinse it out and use it for a fresh supply of milk, and, of course, that milk will not keep sweet very long.

SECRETARY MARTIN: We now stand twenty minutes to four o'clock and we still have another subject before us. Many interesting questions have developed, but we will have to postpone the discussion of them until some more opportune time, and take up the last subject for this afternoon, "Sanitation on the Farm," by Prof. Owens.

Prof. Owens then spoke as follows:

SANITATION ON THE FARM.

BY PROF. WM. G. OWENS, *Lewisburg, Pa.*

The word "sanitation" come from the Latin, meaning "whole." Sanitary conditions, therefore, contribute to wholesomeness, as opposed to sickness.

Sanitary science is of recent date, for, to a large extent, it deals with a class of plants too small to be seen except through the finest miscroscope. These micro-organisms were first discovered in connection with products from the farm at the close of the Seventeenth century. Man is most ignorant concerning the most numerous and widely distributed living things on the surface of the earth. By far the most numerous crop which the farmer raises, he brings to perfection without knowing it. Every cubic foot of air, near the surface of the earth is teeming with plant life. Upon yonder window-pane there is a numerous flora of widely growing plants. The science of sanitation is largely concerned in finding out how to control this plant growth. If the farmer realized the importance of these small plants with which he is surrounded, he would adopt measures to encourage the helpful, and hold in control those which work harm. These microscopic plants are called bacteria, germs, microbes, moulds, fungi, etc. The number of kinds has not yet been counted. Their mode of life is somewhat obscure, but there are some points on which we can be almost certain.

The bacterium is a plant which has no color; it contains no chlorophyl, and therefore does not need the sunlight to grow; in fact, is often killed by sunlight. Many of them are so small that they can only be seen by the help of the best microscopes. It would take 50,000 of them placed side by side to make an inch, and 15,000,000,000, or ten times as many as there are people on earth, are sometimes found in one cubic inch of well-ripened cream. Though they are small, the rapidity with which they multiply makes them assume a place of importance. It has been estimated that if none should die in twenty-four hours, one could multiply to 17,000,000, and in five days there would be enough to fill the oceans. Fortunately for us, this rate of growth does not keep up very long. They assume various shapes; some are spherical, some cylindrical; some dumb-bell shaped; some have appendages at one end. some at both; others have hairs all over them, while others look like rods.

One method of increase is by division, in which one divides into two, and in a few minutes these have become full-grown, and each divides again. The other is by means of spores. The contents of the bacterium collects in different parts of the body, which then breaks up, and each spore can, under favorable conditions, become a new plant. The spores are much more resistant to heat than the plants themselves, and will often remain alive for years, even under the most adverse conditions. Some of them are not killed by the heat of boiling water, if the temperature is not kept up too long. They can also withstand great cold. Temperatures of 350 degrees below zero F. have been unable to kill them.

These, then, are the objects with which we have to deal when we consider the subject of sanitation. Millions of these little plants are everywhere. They flourish in the barn, in the house, in the water we drink, in milk. They grow in dampness, and easily dry up and are carried around by every breath of air. They flourish inside of our bodies, and are ejected with the sputum, so that the sign is almost omnipresent, "Don't spit on the floor."

It is sometimes thought that bacteria are always harmful, and that the very word "germ" suggests disease, but this is by no means the case. Most bacteria are beneficial; they live in organic matter and return it to its natural elements. If it were not for them, organic matter would not decay, and how could we live with all the dead trees, leaves, and animals of former ages lying on the surface of the earth? Or what would our crops do for food, if vegetation of previous years and centuries had not returned to its elements?

The plants we cultivate in the fields, take the elements found in the surface of the earth, and live by appropriating them. The bacteria lives by tearing apart the larger plant, and returning the elements to the soil where the higher plant can use them again. It is this bacteria in manure which gives it part of its value; manure must be handled so as to get greatest benefit from them. Thus there is a perpetual cycle, each taking its part in the never-ceasing round.

As in the higher plant life, so among the bacteria, there are harmful plants, or we might say, poisonous weeds. Some, when taken into the stomach, help digest our food; others produce death, perhaps by digesting us. As in the case of wild plants, the harmful and poisonous ones receive the most attention, so the harmful bacteria have been so frequently discussed that it has given the whole class a bad name. With the beneficial bacteria we are but slightly concerned. They are usually so abundant that we need take no care to get them. Inoculating the soil on a new alfalfa field is an exception. Here we want a new bacteria.

For our purpose, harmful bacteria can be divided into two classes: those which secrete a poison, and those which multiply until there is nothing left to live upon. An example of the first kind is the typhoid germ, which produces a poison in which it cannot live, and so if the patient will live for about six weeks, the germs will all die, and the person get well. This is what is meant by "disease running its course." The other kind is like the tuberculosis or consumptive germ, which exudes no poison, but may live months or years, and kills the patient by destroying the organ in which it is found.

Some one may say that these plants are so small we need have no fear of them, but we must remember that a small enemy is often the hardest to overcome. The traveler who is sick in the wilds of Africa and cannot be moved, is more afraid of an army of traveling ants than he is of a lion or tiger. The lion he can fence out or shoot, but the ants come by millions upon millions. He cannot build a house tight enough to keep them out, and if he kills a few millions, there are plenty left, so that when a small part of the host have taken each a bite, there is nothing left but bare bones. The moth is small, but the people of New England have spent millions of dollars in trying to exterminate them. The San José louse is smaller, but many of us know from experience how hard it is to control. So it is with bacteria; they are small, but terrible. A single case of typhoid fever may be enough to cause a Plymouth epidemic, or such as they had at Butler.

How, then, can we control the bacteria, and keep our surroundings in a wholesome, sanitary condition? If we know under what conditions they grow and multiply, and by what means they are destroyed, we can, perhaps, solve the problem. Bacteria flourish most abundantly in dark, warm and damp conditions. Therefore light, cold and dry conditions, will retard, or it may be, entirely check their growth. But a better way, where it is possible, is to keep the germs out altogether.

When the housekeeper wants to keep berries or tomatoes for winter use, she cooks them to kill the bacteria, and seals them in cans or jars to keep them away from fresh contamination. If, however, she wants to can green beans or corn, she must boil them a long time, for heating to boiling point for a few minutes will not kill the germs in these. Grape juice and cider do not need to be boiled to kill the germs in them, but if canned when almost boiling will keep. For the germs of dreaded and contagious diseases like small-pox, diphtheria, etc., disinfectants are used, but most people do not regularly disinfect their houses. And yet in them live germs which are often as fatal as small-pox itself.

The question of vital importance for us is "where do the germs come from, and how can they be destroyed." Some are found in water. The well is often located near the barnyard or the cess-pool. For a few years the soil may filter out the germs which may come from these sources, but in time channels are worn in the ground, and foul water finds its way into the well. If a case of typhoid fever develops on the farm, the germs are almost sure to get into the well. Milk pails and wash cloths are rinsed in the water, and thousands of the little plants which produce typhoid fever are left on the surface of the pail to start a fruitful crop at the next milking. Many cases might be cited in which fever has been sown broadcast in communities where the milk is used. But even if no germs gets into the water which will produce a specific disease, it is injurious to the body to be compelled to constantly combat the germs taken into the system. The thought of drinking sewage should be enough to cause every farmer to see that the well is so located and surrounded that no impurities can find their way into it. As the country grows older, the water supply will become more and more polluted, until we reach the point they have reached in China, where no one ever drinks water that has not been boiled. They know not why they do it, but throughout the greatest empire in the world, China, people always boil the water before using it. If there is any doubt about the water supply, a drilled well should be put down, away from all sources of contamination, and cased in, so that no surface water can enter. Even then, especially in a limestone region, contamination may travel for a long distance underground.

It might be supposed that a farmer would not need to be admonished to take plenty of fresh air. This is the day of fresh air cures. It may be over-done, but one thing is sure, fresh air is a great healer and purifier. Large quantities of worn out tissue are thrown off from the lungs and skin of every person. By living in tightly closed rooms where the air is surcharged with these bacteria, the body is greatly enfeebled. Especially is this true in sleeping rooms. We spend about one-third of our lives in bed, and therefore should be most careful what kind of air we breathe. The body is relaxed, and cannot so easily throw off the poison during sleep as when awake. Many people think cold air is not pure air, and so close the windows tightly in winter to keep out the cold, not realizing that it is easier for the body to keep warm in a cold, pure atmosphere, where there is plenty of oxygen, than in a warm but foul atmosphere from which the oxygen has been consumed. During the Crimean war it was found that a much larger per cent. of the wounded who were treated in tents recovered than of those who were treated in the hospital. The former could not be made tight enough to keep out the fresh air, while the latter admitted the air less freely. Too much attention cannot be given to the bed-room, which, if not properly cared for, becomes a source of danger.

The cellar is another good breeding place. The germs flourish in the damp, dark atmosphere. Rotting cabbages, turnips, potatoes, etc., are a fruitful source of contamination. Air, sunshine and whitewash, will sweeten the cellar.

Spare bed-rooms and parlors are sometimes kept closed so long, for fear of fading the carpets, that the paper moulds on the wall, and a musty odor pervades them, which it often takes weeks to remove. Sunshine and dryness will kill the germs, and make the room fit to live in. Trees should not be planted so near the house as to keep out the air and sunshine. Sunshine may be hard on the carpets, but it is better to fade the carpets than the children.

The one operation on the farm where sanitary measures are most essential, is in the handling of the milk. Milk is one of the best media in which to grow bacteria. It contains the right elements for their rapid development. It is drawn warm, and unless there are special precautions taken, bacteria by the million get into the milk before it leaves the cow barn. When drawn, it may be almost sterile, but every hair, particle of dust, piece of cuticle from the cow's udder, and dirt of various kinds, carries thousands of germs. These, in the new surroundings, begin at once to multiply, and by the time the milk reaches the city, it may have millions, sometimes hundreds of millions of bacteria to the cubic inch. Is it any wonder the milk sours in a few hours after it reaches the customer? Go into the country barn, and see how well seeded the milk is by the time it reaches the barn. The farm hand comes to the barn with clothes on in which for weeks he has done all kinds of work. They are already well-loaded. He feeds the horses, then curries them; throws down hay for the cows and feeds them; gets the milk pail, comes into the cow stable, kicks up the straw around the cows, slaps or kicks the cow if she does not put back her foot as soon as spoken to, thereby knocking off some of the manure which plasters her sides. The cow also helps along by switching her tail, which is filled with filth. Then he sits down beside the cow. If he attempts to knock the dust off her udder, it is after the pail has been placed beneath. The fore milk he puts on his hands to make them slip easily, and when he has gotten well started there are two streams from each teat. They differ in color, but what of that? Is that picture greatly overdrawn? Do you not know farms near yours where that could be duplicated? Is it any wonder much of the milk that comes on the market deposits a sediment after standing a few hours? No strainer will take out the bacteria after they are once in the milk. There are some bacteria supposed to be so small that they will pass through a porcelain filter, and the microscope has not yet been made strong enough to see them. Does any one suppose they could be removed by a strainer?

The bacteria which thus gets into the milk may not produce any specific disease, but they prevent the milk from keeping. They spoil the flavor of the butter; they may produce butter-milk, blue-milk, red milk, ropy milk or some other quality, if the proper germ is present.

In short, in the house and in the barn, there are numerous bacteria which only need a favorable medium in which to grow. They may directly or indirectly produce the most undesirable results. Keeping things scrupulously clean, well aired, and flooded with sunshine, will alone make sanitary farm surroundings.

SECRETARY MARTIN: We will now stand adjourned until half-past seven o'clock this evening. You will find the trolley cars waiting down in front of the New Leslie Hotel to take us out to Cascade Park. I trust you will all join in this little excursion; you will find the park a beautiful spot, and we will have ample time to see it and get back to the hotel in time for dinner. This evening we will have an interesting program. The session will be in charge of the ladies, and we hope to see you all here.

The session thereupon adjourned for the purpose of becoming the guests of the Trolley Company on a ride to Cascade Park.

New Castle, Pa., May 28, 1908, 7.30 P. M., Thursday.

Mrs. Martha E. Martin in the Chair.

SECRETARY MARTIN: This is Womens' night, and the entire program will be filled by our womens' corps of lecturers. I know you are all interested, because of the assistance the ladies render in our Farmers' Institutes; as much of their success is due to their kindly aid. We have arrived at a period in our Farmers' Institute work when this truth must be recognized more emphatically than ever before, and it is in recognition of this fact that we have devoted one session of this, our Annual Normal Institute, to their work. Before, however, we take up the program of the evening, we will listen to the report of the Committee on Resolutions.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Mr. Gooderham, Chairman of the Committee on Resolutions, read the following Memorial Resolutions:

WHEREAS: Our dear brothers and genial coworkers, H. L. Harvey, of Blair county, and John McElhose, of Indiana county, have during the past year been removed by the hand of death; therefore,

BE IT RESOLVED: That we humbly submit to the Divine Will of the One who doeth all things well, and yet regret the departure and mourn the loss of those very excellent helpers in the great work of agriculture.

WHEREAS: The Great and Supreme Ruler of the universe has in His infinite wisdom removed from among us one of our worthy and esteemed colaborers, Hon. William H. Brosius, Lancaster county, and

WHEREAS: The long and intimate relation held with him in the faithful discharge of his duties in this organization makes it eminently fitting that we record our appreciation of him, therefore, RESOLVED: That the wisdom, ability and sociability exercised in the aid of our organization by his service and counsel will be held in grateful remembrance.

RESOLVED: That the removal of such a life from among our midst leaves a vacancy, and a shadow that will be deeply felt by all the members and friends of this organization, and will prove a serious loss to the community in which he lived;

RESOLVED: That with deep sympathy with the bereaved relatives of the deceased, we express our hope that even so great a loss to us may be overruled for good by Him who doeth all things well;

RESOLVED: That these resolutions be spread upon the minutes of the organization, and a copy be sent to the family of the deceased.

E. S. HOOVER,
J. ALDUS HERR,
NEAL HAMBLETON,
Committee.

SECRETARY MARTIN: You have heard the resolutions relative to the taking away of these brothers. Are there any remarks?

PROF. MENGES: Mr. Chairman, may I say a word? It was my privilege to be present at a meeting of the Farmers' Institute held at Black Barren Springs, Lancaster county, one or two days after the death of Mr. Brosius. At that meeting was Mr. McSparran, who, politically, belonged to the opposite party from Mr. Brosius. Mr. McSparran volunteered to make a few remarks on the resolutions adopted at that meeting, and he said, "I was at one time an opponent of Mr. Brosius, as aspirant for election to the legislature of Pennsylvania; we met on the political platform and discussed political questions; it was a heated campaign, but never," said he, "in all the heat of political discussion did Mr. Brosius for one moment lose his temper. He was always the amicable gentleman, gentlemanly in every way, and he would not do a single mean thing even under those conditions." That was a tribute worth having, and I can say for Mr. Brosius, that he always had a smile on his face, and one day at a meeting like this, a gentleman who is in this audience said to him, "Mr. Brosius, you always meet people with a smile;" he replied, "It costs me nothing to greet a man in that way." I know that he has always been that kind of a man, and the people of Lancaster county appreciated his services; they elected and re-elected him to be chairman of their county institutes year after year. He did not do very much work; he said, "I simply sit here, and let the other fellows do the work, but I see that what is done is right. I let every man have the honor of doing things the way he thinks they ought to be done, but I see that they are done right." And I never attended institutes that were better managed than those managed by Mr. Brosius in Lancaster county, in which the people had more part, and I attribute it largely to the gentle manner in which Mr. Brosius approached his friends. Another thing he has done is, that whenever this Board wanted anything from the Legislature, Mr. Brosius stood by it and voted for it, and in many instances it was due to the practical manner and earnest efforts of Mr. Brosius that the Board got what it asked for. The State Board of Agriculture has lost a good friend in Mr. Brosius.

MR. PEACHEY: I also had the privilege of attending the memorial exercises of which Mr. Menges has just spoken, and when I heard one of the officials and directors of the Philadelphia Mint speak of the worth of Mr. Brosius, both in his county and in his home, I had a fresh appreciation of the man. I knew him in the Institute work, and he was my friend, and I liked the man who always had a pleasant word with which to greet me, no matter what the occasion.

MR. KAHLER: Mr. Chairman, I can hardly do justice to my feelings unless I rise and simply endorse what has been said in regard to Mr. Brosius. I knew Mr. Brosius and have been associated with him for twenty years in Institute work, and I always took him to be an upright, clean, honorable man.

MR. HOOVER: Mr. Chairman, I feel it my duty, being one of the co-workers of the Hon. William Brosius, to say a few words on this occasion. I was a co-worker of his for quite a number of years, and I can add my testimony to the worth of the man. Mr. Brosius was an honest man in the true sense of the word. Both in our Institute work, and in the House of Representatives, where I had the pleasure of serving with him, I found him the honorable, courteous gentleman; he was ever on the side of the right, and on the alert to serve his constituents. Reared in the Quaker Society, he had a deep and abiding sense of right, and he lived so as to gain the respect of his community. I was present when the last rites of respect were paid to him by not only hundreds, but thousands of his neighbors and constituents, and their testimony all showed the esteem in which he was held by his friends. We have, indeed, lost a worthy man; let us take it to heart and live a life that when we are called to go, our friends and neighbors can bear the same testimony regarding us that they now do to him. I thank you for your attention.

SECRETARY MARTIN: My friends, it is rarely at our Annual Meeting that we are called upon to mourn the taking away of three of our members. Mr. McElhose, whose name is recorded in these Resolutions, was a stranger to most of us, only having served with us for three or four months. I never met the gentleman, but feel an acquaintance with him because our correspondence was a pleasant one. I learned from his friends that he was a fine, upright, conscientious citizen. May he rest in peace.

Mr. Harvey, the oldest member of the Board in point of years, was a wise counsellor, and faithful in the performance of his duty. He had lengthened out his life far beyond the alloted span, and now, I trust, is living in the enjoyment of the life beyond.

In the taking away of Mr. Brosius, his family has lost a faithful and loving father, and the State has lost an upright and useful citizen. The Department of Agriculture, and the Farmers' Institute, have lost a loyal member, and a wise counsellor. In his taking away I have lost one almost as a brother, for I can remember no time, no circumstance amid all the arduous duties of the past ten years, in which I could not go to Brother Brosius for counsel and advice. Under all circumstances, he wore that genial smile, and that he may find that smile among those of the angels above and surrounding us is my hope.

Are there any other remarks? If not, the President of the evening will please come forward and take charge of the Ladies' Session. Mrs. Martha E. Martin will now take the Chair.

Mrs. Martin took the Chair and the Ladies' Session was opened with prayer by Rev. T. J. Ferguson.

The PRESIDENT: The first number on the program this evening is an address by Mrs. Sarah B. Fritz-Ziegler on "The Farmer of the Future in the Child of Today." This lady was left a widow with four small children and a mortgage on the farm. On this farm she has made money enough to educate her children and lift the mortgage. For the last two years she has been a faithful institute worker. Mrs. Ziegler will now speak to us.

Mrs. Ziegler's paper is as follows:

THE FARMER OF THE FUTURE IN THE CHILD OF TODAY.

By Mrs. Sarah B. Fritz-Zeigler, *Duncannon, Pa.*

The subject I want to talk to you on is one that has given me much concern, and I thought much of my co-workers and the great work that is before us if we give it the thought and effort it should have to make it a success, for true it is that "The Farmer of the Future is the Child of Today," yet how little thought and attention we have given the subject in our institutes. You hear the instructors talking to the farmers and their wives about the betterment of farm conditions, the restoration of soils, the improvement of barns and poultry houses, the importance of improved breeds of stock, the ventilation of stables, etc., but how seldom we hear of the betterment of home conditions, and the care of the child life, and child nature, that are developing or trying to develop in that farm home.

Then, too, we hear much of the necessity of education for the farmer, which is a dire necessity, but how shall we reach that farmer, for very often the one most in need of information is the one who has least ambition along that line, takes very little literature, and will not attend institutes; saying, he knows as much about farming as anyone.

Now, the best way to reach the masses is to awaken the mothers of the present to the grave fact that such education begins with the child in the home, and have them aim to have that education given a broad, wide foundation. Educate morally, mentally, physically and socially for you find that the greatness of most of our noted men was owing to the home training at the mother's knee. You have no doubt often heard the saying of the priest, "Give me the first seven years of a child's life and I do not care who has him after that." He knew that he would be so rooted and grounded in the truths he taught him, that no after storms would be able to sway him from those teachings. Now, if this is so, how doubly important that the training of the child begins early.

In the first place we want to have the best environments possible surrounding the child. Be we rich or poor, we can have bright, pleasant homes, filled with cheer and good humor. Sanitary homes flooded with light and sunshine. No matter if the carpets do fade a little, we want to let the sunshine in. Some of you would be rather surprised to know that there are yet homes where the shades are kept down and rooms closed, until they really smell musty when opened for guests. We want no part of the house too good for the family to use. Use all sanitary precautions to keep the house healthful and clean. Have a neat lawn about the house and have the home cheery and tidy outside as well as in. Then too, we want to pay especial attention to furnishing wholesome, appetizing food, seeing to it that we do not impair the digestion and health of the children as we want to fortify them with sound minds in sound bodies as far as in us lieth.

Since the most important school is the home, and that there are implanted the strongest impulses that determine the future character of the child of today, who will be the man or woman of the future, how important that we are awake to the duties and responsibilities that rest on us as instructors and helpers of our fellow man, that we give the home life on the farm more attention.

If you doubt how messages pertaining to home life and child training will be received, some day look into the faces of an audience when these topics are talked on and note the rapt, eager look on the faces of many mothers and I think you will experience some of the pity that must have swayed the great Teacher, who taught the multitudes, and you will wish for the power to help and brighten their cares, and above all, the power to awaken in every heart the importance of proper child training. So much of this training depends on the mothers in the home, yet so often they allow the tasks of the day, the worries and anxieties to so engross their time and thoughts, and in their endeavors to be faultless housekeepers they overlook the fact that it is just as important to be good homemakers, and the all important matter of proper child training; that is made a secondary matter often. The fact of children being good imitators should not be overlooked. If they are surrounded by bright cheery natures, good manners, kindly courtesy and unselfishness they will acquire the same habits in a measure. Robert Savage Landnor says:

> "Children are what the mothers are,
> No fondest father's proudest care
> Can fashion so the infant heart
> As those creative beams that dart
> With all their hopes and fears upon
> The Cradle of a sleeping son."

The duty of parents is not merely to feed, clothe and supply the material wants of their children, but to feed and train the mind as well. Teach them to think, and help them build beautiful characters, interest them in the higher ideals of life which will mean so much to them in later years. Next to the love of God teach them the love of nature, which is God's handiwork. Show them the beauties of the firmament, and the day breaking over the hills, and you will implant into their very being a love of the country that will go far toward keeping them on the farm, and will instil into their hearts the love of the true, the good and the beautiful. Teach them that the essential elements of the human character are truthfulness, integrity, and goodness. But while teaching principles of honesty by precept, let us be consistent and not teach the opposite by example, as the story is told of a farmer, who was the owner of a lot of fat steers, which were ready for market. He was giving vent to his indignation on account of the manner in which the beef trust was robbing the producer. He gave it as his opinion that the trust magnates and robbers ought to be in the penitentiary. Then turning to his hired man he said, "Fred, those steers are to be ready for that cattle buyer tomorrow morning. See that they don't have any water today, but give them all they want to drink about a half hour before they go on the scales," and the hired man, who was good at figures, estimated that those steers drank something over 8,000 pounds of water that morning for which the honest cattle raiser pocketed 5c a pound.

Now, if we can have the principles of truth and honesty instilled into the child's heart he is ready and safer for the school training, and I regret to see how much at fault our public school system is in the education given the children on the farm, for it all tends away from the farm instead of to it, and no wonder the child does not have a love for the farm for he is taught nothing of growing plants, chemistry of soils, etc. If he would be taught the beauty of every growing thing from the germination of the seed to the tiny spear of green, followed by the unfolding of leaves to the maturity of the plant, he would attain a love for the work, and would not be so eager to leave the farm, and farm life, but would take such an interest and pride in the work that he would be glad to be able to say, "I am a farmer," and he will dignify the profession.

I can express my meaning regarding schools in no better way than by quoting a few words of President Roosevelt's:

"We should strive in every way to aid in the education of the farmer for the farm, and should shape our school system with this end in view, and so vitally important is this that, in my opinion, the Federal Government should co-operate with the State Government to secure the needed change and improvement of our schools. Too often our present schools tend to put altogether too great a premium upon mere literary education and therefore to train away from the farm and shop. We should reverse this process."

A very important thing in the education of the child is to have him learn to express his thoughts in his own words instead of quoting the words of the text-book. You now hear many farmers say, "I know how to do things, but I cannot express my thoughts intelligently to tell others." And too often if you look for a good honorable man to fill some important office he is wanting for he lacks confidence in himself, and will not accept, and you must look to the towns and cities for a man to send, and of course they will work for the interests of their kind before they will for the agricultural class, and we have no right to complain so long as we will trust our interests to outsiders.

Now we want the child of today to learn to think, then to acquire the art of expressing his thoughts clearly and sensibly. Then when he reaches man's estate and is called to an important office or to the legislative halls he will know what he wants, and will be able to present his claims, and if he has had the principles of honor made part of himself he will not be so apt to be bought but will stand for the right; and will feel that:

"Better than grandeur, better than gold,
Than rank and duties a thousand fold,
Is a healthy body and mind at ease,
And simple pleasures that always please.
A heart that can feel for another's woe,
With sympathies large enough to enfold
All men as brothers, is better than gold.

"Better than gold is a conscience clear,
Through toiling for bread in an humble sphere;
Doubly blessed with content and health,
Untired by the lusts and cares of wealth;
Lowly living and healthy thought
Adorn and ennoble a poor man's cot;
For mind and morals in nature's plan,
Are the genuine tests of a gentleman.

"Better than gold is a thinking mind,
That in the realm of books can find
A treasure surpassing Australian ore,
And live with the great and good of yore.
The sage's lore and the Poet's lay,
The glories of empires passed away;
The world's great dream will thus unfold,
And yield a pleasure better than gold.

"Better than gold is a peaceful home,
Where all the fireside characters come—
The shrine of love and the heaven of life,
Hallowed by mother, or sister, or wife.
However humble the home may be
Or tried with sorrow by heaven's decree,
The blessings that never were bought or sold
And center there, are better than gold."

In summing up then, if we want to better the conditions of farm life for the farmer of the future, we want to interest the mothers of our land in the matter of right child training, and have them feel what a sacred trust is committed to them, and that the duty to the child is paramount to all other duties. I do not mean coddling the child, waiting on him and making him selfish and arrogant, but guide and direct the unfolding mind and teach him to be prompt, honest, obedient and self reliant, and to feel that in his upward trend he is like a ship at sea.

"Love is the glowing quenchless fires
By coals of pure thoughts fed;
Will is the stream that still aspires
To reach some goal ahead.

"Determination, the engines strong
That faith well oiled will keep,
And courage the lookout, tho tried long
Must not one moment sleep."

Then we must do what we can to have our public school system different, so we can have the principles of agriculture taught in country schools. I know this will take agitation, but it will bring results, and if the child will have the proper education in home and school and decides to be a farmer, he will be one who will be a credit to either farm or office, and will be awake to all best methods and be an honor to American citizenship.

The PRESIDENT: Next on the program is Mrs. Mary A. Wallace, a daughter of Lawrence county, and for eighteen years a newspaper and magazine writer; she has for a number of years conducted the Young People's Column in the leading newspaper of Pittsburg. Mrs. Wallace will now speak to us on "Thoughts for the House Mother."

Mrs. Wallace, after some introductory remarks, then read the following paper:

THOUGHTS FOR THE HOUSE MOTHER.

MRS. MARY A. WALLACE, *Pittsburg, Pa.*

Housewifery in these days is too little appreciated. Its importance not only to the family, but to the state and nation, is underestimated by women in general. They seem to have lost sight of the fact that the highest art known to mankind is the art of housekeeping. To be able to cook, to mend, to sew, to be efficient in what we understand as domestic science, is of infinitely more importance than equipment in Greek, Latin, Literature and Music. It is certainly true that these homely accomplishments and virtues are a source of greater happiness and comfort in the home than all the other so-called higher accomplishments.

What is needed in this day and generation is the elevation of the science and art of housekeeping, to that of the other arts and sciences. It is a lamentable fact that the girls of today will work in stores, shops, and factories, at well-nigh starvation wages, rather than do housework. Last spring I was talking with a young lady whom circumstances had made necessary that she earn her own living. In the course of our conversation she told me she was going to work in Blank's store, in Ellwood City, the next week. I inquired as to her salary, when she replied "three dollars a week until September; after that, four dollars, except during the holidays, five dollars." "Oh," I said, "Mary, why don't you do housework; I can give you the name of half a dozen good women who need your services, and who will give you the same wages, and your boarding and room besides." She replied, "Mrs. Wallace, I would like to; I just love to do housework; but you know it's so degrading. A girl who does housework now-a-days isn't considered anybody." This, I find, is the prevailing opinion of our American working girls, but how or why such an idea could have originated, I have not time to discuss. The fact is, this idea prevails, and has become so deep-rooted that it will prevail until the state takes it up, and the household arts and sciences are added to every public school curriculum in the land.

Domestic science is being taught to some extent in the public schools of our larger cities, and in some of our colleges and universities, but the hundreds of thousands of girls in the country need the instruction, and must have it. You say, "how can we reach them; how can these things be taught in our isolated rural schools?" Let me tell you. As most of the members of this institute know, I am an ardent advocate of the consolidation of the rural schools. That little children must walk a mile and a half or two miles to school through all sorts of weather, often the thermometer below zero, is a blot on our twentieth century civilization. But if our schools were effective, if they gave our children a practical education, we would not have so much to complain of, but you know they are not what they should be—what they can be made.

Many of you here tonight remember the blast furnaces down the Beaver, one at Wampum, and the other a short distance below Rock Point, and there were others throughout the country. These furnaces were considered great in their day, but they have disappeared, and grass grows over their ruins. The larger furnaces along the cities and towns along the railroad can do better and cheaper work. They can economize and conserve all the forces that go to make a good furnace.

So will it be with the district schools. They will pass away, and their isolated forces will be concentrated in the consolidated school, in which manual training, nature study, agriculture, the household arts, and other vital things, necessary to make a practical education, will be taught effectively. This thought, friends, I would impress upon every one of you, and earnestly ask your best work and influence along the line of consolidation. The children of the country deserve, and must have, as nearly as possible, the same advantages as the children of the city. I trust you will pardon this seeming digression from my subject, for really it was not. The rural school and the farm home are inseparable. The influence of one is felt upon the other, and therefore, is it not most important that the influence of the school shall make for the betterment of the home, not only the homes of today, but those of the future.

DRUDGERY.

Almost the first thing the housemother should do is to transform drudgery into pleasant work. Indeed, the one thing that all workers need to do, and perhaps farm folk more than any other, is to keep above the thought of drudgery, to look beyond the toiling to the results. To illustrate this thought, I will read a letter written by Mrs. Garfield to her husband before he became president, in the hope that it may prove an incentive to more exalted work in the home. She wrote: "I am glad to tell you that out of all the toil and disappointment of the summer just ended, I have risen up to victory; that the silence of thought since you have been away has been for my spirit a triumph. I read something like this the other day: 'There is no healthy thought without labor, and thought makes labor happy.' Perhaps this is the way I have been able to climb up higher. It come to me this morning when I was making bread. I said to myself, 'Here I am compelled by inevitable necessity to make our bread this summer. Why not consider it a pleasant occupation, and make it so, by trying to see what perfect bread I can make?' The whole of my life grew brighter. The very sunshine seemed to flow down through my spirits into the white loaves, and now I believe that my family is furnished with better bread than ever before, and this truth, old as creation, seems just now to have become fully mine: that I need not be the shrinking slave of toil, but instead its regal master, making whatever I do yield its best fruits."

EXECUTIVE ABILITY.

Executive ability is needed in the housemother, fully as much, if not more, than in the Speaker of the House of Representatives. Without it, confusion will reign in her household, and she herself may rush hither and thither for eighteen hours out of the twenty-four, yet accomplish little except to work herself into a nervous headache. The housekeeper should plan the work carefully. Some housekeepers plan their work for the day in the morning before they arise, and study how they can accomplish that work with the least labor and expenditure of strength. This is the part of wisdom, but I am sorry to say that most women on awakening in the morning, jump out of bed hurriedly, hurry into their clothing, and hurry off to the kitchen to hurry up the breakfast, and keeping up this continual hurry they are tired and exhausted before the middle of the day. Ah, this fever of excitement, under which so many work, is most detrimental to health and happiness, for it is one of the great causes of nervous ailments so common among us women. An old Arab proverb is "Hurry is the Devil," and, my sisters, I warn you tonight to keep yourselves free from his malign influence by keeping yourselves calm and serene at all times. If, however, you should at any time feel that you are becoming hurried and excited with your work, or when you are going somewhere you cannot find some of the belongings that you wish to wear, and your sure you'll miss the train, or be too late for that meeting, and you are losing control of yourself, stop long enough to say, "Get thee behind me, Satan," and if you speak firmly enough he will leave, and in his stead calm and serenity will reign, and you will get that work done without any trouble, or you'll make that train or get to that meeting on time. But if you should not, there will be another train, and there will be another meeting. Peace of mind is paramount to everything else in the life of either man or woman.

WORRY.

And now I want to speak of something that is akin to hurry, which is worry. Worry is one of the worst things in which any one can indulge. Persons who worry are not fit companions for anybody. They are not happy themselves, and they keep every one about them in hot water, unless, indeed, it be true, in rare instances, what the little boy said when asked about his mother "Oh, she's all right, but she's worrying awfully about the crops; she thinks they're going to be a failure this year; but then mother's never happy unless she's worrying about something." I hope none of us derive our pleasure in this way. There are housekeepers who worry over their work, and I want to tell you, worry is the enemy of work. It enlarges it, and distorts it, and makes it appear so prodigious, to what it really is. Take, for instance, the attic, which is such a bugbear to most women at house-cleaning time. It is not half the job to clear up that attic as they imagine, if they would only get at and do it, and not think about it and worry over it. The same may be said of all what we call "hard jobs." A good neighbor of mine was visiting one spring. When I went to the cellar for something, she went along, and as I opened the door she exclaimed, "Oh, my! you have your cellar all cleaned and white-washed, and I haven't touched mine yet, and it's just as dirty and moldy as it can be; I've been worrying about it for weeks." She is a strong, healthy woman, who does her own work. She took time to go visiting, but how much better it would have been for her, for her peace of mind, and perhaps for the health of the family, if she had first cleaned her cellar, and then gone visiting, with no thought of its dirt or mold to worry her.

Another trouble with many housekeepers is, they try to do too many things at once; they get too many irons in the fire, and the result is they do not accomplish as much as they had expected, and then they worry. Every housekeeper should make it a rule to do the most important and necessary things first, and do them well, and throw overboard from their minds the forty odd things that can wait until they have time to do them, and let them go without a thought until that time comes. Ordinarily, work in itself never killed anybody, but when it is performed to the accompaniment of nervous worry, work which in itself is a blessing, degenerates into drudgery, which is a curse.

I have been speaking only of what we call little worries, or worry over little things, but friends, it is most important that we avoid this. It is not so much great trials or troubles, but rather the little "daily dyings" that cloud the sunshine of life.

Unavoidable trials and troubles and sorrows of various kinds come to all, to every one, the high and the low, the rich and the poor, who live an average lifetime. No one is exempt. Sorrow, it hath been said, is the soul's gymnasium, making us stronger, and enabling us to bear more bravely whatever may become our burden. I would not tell you, as so many lecturers and writers do, to always look on the bright side of trouble—that every cloud has a silver lining, for the reason that our mental vision may be so blinded by the shock of contact with that trouble, that we are unable to see any bright side, any silver lining. The only thing for us to do, when trouble of any sort presents itself in our pathway, even though it threaten to overwhelm us, and we feel as it bursts upon us, as if the very heavens are crashing round our head, is to rise in our spiritual strength and face that trouble squarely and bravely as a fact, as but an incident in our lives, and not allow it to overcome us either mentally or physically, doing the best we can under the circumstances.

But, friends, the man or woman who has a sublime faith and trust in the destiny—the Divine Destiny that "shapes our ends" is the one who can meet every emergency and every obstacle in life's pathway triumphantly. And there is a point which may be gained by mental toil and struggle and faith, from which we can, like the traveler on some lofty mountain height, look down upon storms below, while he is walking in sunshine.

Human nature, however, is so prone to magnify life's little crosses. The State of New York has been obliged to enlarge her asylums, and build new ones, to accommodate her rapidly increasing insane, whose minds were wrecked by financial losses during the panic last fall, and we scarcely pick up a newspaper anymore in which there is not an account of a suicide because of financial trouble.

In striking contrast to these was the Wall Street broker, who went home one day last winter and said to his wife, "Well, Molly, do you know we are not worth a cent this evening? I couldn't meet the call on copper this morning, and had to let her go, and it simply wiped us out." Woman-like, she began crying, when he said encouragingly, "Never mind; don't cry; I began life with a shoe string and a barlow knife in my pocket, and can do it again. We'll get along all right; never fear." Now, this is the spirit which all men and women should cultivate. I include women, because I can name a woman whom her friends told was "a raving maniac" because of her husband's losses a few weeks ago. We should not become so engrossed in our business that if it is not a financial success, we are in despair. It is right to try to better our condition, to make money, if we make it honestly, but we should not set our hearts upon it, to the exclusion of everything else. In these days, when riches, as never before, are "making themselves wings and flying away as eagles," we should ever remember that fortune is a fickle jade, and that often when we think we have her in our grasp, she gives us the slip.

These lines from Omar Kyyham beautifully express the idea I would convey:

"The Worldly hope men set their hearts upon,
Oft turns to ashes; or it prospers, and anon,
Like summer snow upon the desert's dusty face,
Lighting a little hour or two, is gone."

DISCONTENT.

Another habit that is all too prevalent both among men and women is restless discontent. Persons who have allowed this spirit to take possession of their hearts, are of all people the most miserable. They are never at rest. They are forever dreaming of what might have been. They look before and after and pine for what is not. They are like the voices of the wind, which moan for rest, but rest can never find.

We should cultivate a spirit of contentment, and, as Prof. Swing says, "Set up all the higher ideals"—a quiet home, vines of our own planting, a few books full of inspiration, a few friends worthy of being loved, and able to love us in return, innocent pleasures that bring no pain or remorse, a devotion to the right that will never swerve, a simple religion devoid of all bigotry, and full of trust, hope and love, and to such a philosophy the world will give up all the empty joy it has.

Epicures tell us that contentment consists not in great wealth, but in few wants. Ruskin says to watch the corn grow, or the blossoms set, to draw the hard breath over the plowshare or spade, to read, to think, to live, to pray, these are the things that make men happy and contented. Timothy, you know, classes contentment with Godliness, when he says "Godliness, with contentment is great gain."

If there is any class of persons who should be contented at all times, but especially in such times of financial depression as our nation is now passing through, it is the farmer. Ah, yes, my friends of the farm—men and women—I am sure if you could but realize the hunger, the want and the woe, that is, and has been stalking through our cities and towns the past months, you would go home tonight praising God that your lines were cast in the country, on the farm, where if one works and is economical, he will never hear his children crying with hunger, and have nothing to give them to eat.

The PRESIDENT: The next on the program is Mrs. C. W. Brodhead. In earlier days she took up the work of a practical nurse, and is now engaged in beautifying her own home, and in raising pure bred Plymouth Rock Hens. Mrs. Brodhead will now speak to us on "Beautifying the Farm and Village Home."

Mrs. Brodhead thereupon read the following paper:

BEAUTIFYING FARM AND VILLAGE HOMES.

BY MRS. C. W. BRODHEAD, *Montrose, Pa.*

In taking up the subject of beautifying village and farm homes, my idea is that beautifying the home does not wholly consist of the decorations and surroundings of the home, but that each inmate has a part to do. In none of the ancient languages, nor in those of modern times, aside from English, is there a word expressing the ideas and associations which are aroused at the sound of the simple word "home."

In this great fact of "home" lies the superiority of the people who enjoy it and know full well what it means. It is the centre, the unit, the hub, around which everything revolves, from which everything of national good flows. There can be no great people, no great nation without its inspiration, "Home, Sweet Home." Dr. Stark says, "The only test of the utility of knowledge is its promotion of the happiness of mankind." Viewed thus, the subject

I am about to treat, presents claims superior to most others, and is eminently worthy of study. The superintendence of a house, and the management, forethought, domestic economy, and good sterling sense, requisite for the discharge of this duty, demand application and perseverance, and ought to receive as much, at least, as is bestowed on the acquisition of music, painting, or any of the ornamental acomplishments. Young ladies are educated to shine in society; would it not be well if they were also sedulously taught by a system of training to perform the homely duties which make the home the abode of comfort both indoors and out.

It has been said that Americans in general have little attachment for home. Often, indeed, is the domestic comfort, so prized in England, absent from the abodes even of the wealthy in our land. May not this undeniable fact and the roving propensity of young people in this country, be attributable to the circumstance that girls whose conditions exempts them from servitude, are brought up wholly without reference to home duties? Even those who may depend on their own labor for a subsistence, are taught some trade, or superficially qualified as teachers, or instructed in various branches or needle work, while they know little or nothing of household matters; though such knowledge would enable them to command independence.

It is not alone the wife and mother who should be skilled in domestic affairs; every girl who has emerged from childhood, is liable to be called on to take charge of a house. If the mother is ill, or deceased, why should the father of daughters sixteen and eighteen years old be compelled to look elsewhere for a housekeeper, and intrust the management to the hands of a stranger? The general cultivation of this valuable knowledge, too, would make the occupation of a "help," or servant, more acceptable to thousands who now prefer starvation in a garret, or the ruin of health in sedentary employments. The more attention is turned to this branch of learning, the more will its importance be recognized, and the higher place will it assume in the list of useful arts; and a degree of respect being accorded to those who excel, more will be found ready to engage in it as a profession.

What an improvement would be made by such a result, in our social and domestic life! I would not be understood to say that we would have a woman merely an upper servant in the house it is her province to guide, or that I undervalue intellectual attainments and elegant occupations. But it will not detract from the charm of these, nor from the dignity of the well-bred lady to be familiar with the routine of domestic duties, well acquainted with the minutia of household economy, and competent to direct, or if need be, teach her servants; aye, even, to do things herself in cases of necessity. On the other hand, will it not enhance admiration and strengthen regard, to see that she possesses these acquirements and is willing to exercise them to promote the comfort of others? Who can tell that she may not, at some period of life, be thrown into circumstances where the mere fine lady would be utterly helpless, or where intellectual refinement and distinguished position may prove less available than industry, ingenuity, and practical common sense?

What is a kingdom, a merchant's counting-house, or a mechanic's work shop without a head? I do not mean a mere master, but a presiding intellect to plan, contrive, direct, and guide. Not less absolute or important is the rule of a sensible woman in her own home. She has full scope for the exercise of good taste, prudence and refinement. She is invested with an amount of responsibility she perhaps never dreamed of, for her influence over the temper, habits, actions, and disposition of those about her is very great, and great in proportion should be her self-government, for with self the command must begin, if it is to be worth having.

There is much talk, now-a-days, about the "rights" and "mission" of woman. Without entering into the merits of the subject, I would only say, that if women from the highest to the lowest, were systematically educated to wield properly the great power they possess, a power which can be made to move the secret springs of actions, and the machinery of business, they would have little reason to complain of the want of influence. And were they so trained to enter actively and energetically into domestic employments and affairs, that none could deem it a pursuit unworthy of them, they would find ample scope for the exercise of their faculties, and the acquisition of means to live. Neither would I have domestic economy and home duties vaunted, or made the constant theme of conversation; they are the private employments of a woman. She must study other things in order to entertain her relatives and friends. Those who talk most of their duties are generally those who perform them most imperfectly.

When a man returns to his home, or enters his sitting room, fatigued and perhaps disappointed by the business of the day, he does not want to be annoyed by the detail of domestic accidents, the misdemeanors of servants, and the cheatings of trades-people. He has had his worries during the day, too, and with that pride, or reserve, or want of confidence which is peculiar to most men, he perhaps keeps them to himself. Let his example be followed in all cases, where advice, or support, or assistance is not absolutely necessary and pleasant, cheerful themes be chosen, or some amusement be selected which shall render the evening and leisure hours those of relaxation, and enjoyment and tend to give a charm and zest to home which no other place can possess. Men are free to come and go as they list, they have so much liberty of action, so many out-door resources if wearied with indoors that it is good policy, if nothing else, to make home attractive, as well as comfortable.

This world is a beautiful one, spite of what grumblers say, and thousands would find it a much happier one if they studied more what they ought to do, and sought their pleasures, or indulged their fancies less. Every human being exercises some influence on the character, happiness, and destinies of others, and is accountable for opportunities wasted and blessings neglected or transformed. This is especially true of women. Every sensible, high minded, right hearted woman, be she peeress or peasant, is, or may be, a blessing to many; if not by great deeds or achievements the world calls heroic, by a simple, quiet, straight-forward performance of the duties which lie before her and are therefore given her to do.

Thinking of happiness, we think of home. It seems to me that a happy home is the nearest approach to heaven we are likely to find here on this terrestial ball; it almost seems to me that it is the expression on earth of that ideal which the race has so long held of a heaven after death. Where happiness, where love is, there is heaven. The most beautiful mansion in the world, magnified in proportions, with furnishings beyond the ordinary power of description, is not home unless the inmates thereof are filled with the spirit of loving and giving. Indeed, it seems to me that the palaces of the very wealthy—in money—are never homes in the true sense of the term; that the highest type of home is found among people of the middle class. In such homes the members are united. They are interested in each other and in the home life. They learn the lesson of appreciation, to show their love in words and deeds, and so they find the real happiness of home. They plan for a new carpet, a desk, a set of furniture, something that is to benefit them all; and all help along and rejoice in its acquisition.

Be sunny. Do you know that a sunny disposition is the most to be desired in life? We do not depreciate the value of money, well knowing that in moderate amount it is very essential to our welfare; but if we were compelled to choose between a large fortune and the faculty of extracting sunshine from a cloudy day, we should choose the latter without an instant's hesitation. Because it is happiness, we are all seeking for, and money alone will not give happiness; while the mind which is content and glad, which sees beauty in the common things of life, is a source of joy always. To wear a bright, hopeful countenance, to radiate joy and encouragement, is a duty we owe our fellow creatures; the reflected warmth and brightness of a sunny disposition is sure to make glad its possessor.

Try to avoid sadness and worry. There is no more noxious weed in the garden of life than worry. Another bad habit to overcome or avoid contracting is that of "borrowing trouble." People who do this are never the ones who do the best work or are prepared to meet real trouble when it comes. There was once a man who was always looking for a fire in his house and expecting one every night. He had all kinds of extinguishers to fight fire. At last it came, but as usual the unexpected happened. His night shirt caught fire and his neighbors will never forget the sight he presented as he ran screaming down the street, (leaving his fire extinguishers behind) yelling for help at the top of his voice. A man who seldom thought of fire, but knew what to do, caught him and threw him down, rolled him over on the ground, and he rose up a singed but wiser man.

The laughter of boys and girls is, and ever was, among the most delightful sounds of earth. Truly there is nothing sweeter or pleasanter to the ear than the merry laugh of a happy, joyous boy or girl, and nothing dissipates gloom and sadness quicker and drives dull care away like a good hearty laugh. We do not laugh enough; nature should teach us this lesson, it is true. The earth needs the showers, but if it did not catch and hold the sunshine too, where would be the brightness and beauty it lavishes upon us? Laugh heartily; laugh often; not boisterously, but let the gladness of your hearts bubble up once in a while. and overflow in a glad mirthful laugh.

When an American farmer, after a protracted absence starts to return "home," he does not think of it as simply a domicile, a place to stop at; the word means to him far more. His affections, his aspirations, his whole being are touched and wrought upon by the visions in a whole panorama; the farm and its adjuncts, the lowing cattle, the barking dogs, the cackling chickens, all the sights and sounds made familiar to him by long associations. In the centre of it all is a figure called "mother," without which home in the real sense cannot exist.

It is because of the peculiar regard bestowed upon woman among the English speaking people, the estimation in which she is held, the deep respect and almost reverence felt for her, that "home" as we know it, becomes possible:

"A little lad came in one day,
With dirty shoes and tired feet;
His playtime had been hard and long,
Out in the summers noontide heat.

" 'I'm glad I'm home,' he cried and hung
His torn straw hat up in the hall,
While in the corner by the door,
He put away his bat and ball.

" 'I wonder why,' 'twas laughingly said,
'This little lad always comes here,
When there are many other homes,
As nice as this, and quite as near.'

"He stood a moment deep in thought,
Then with the lovelight in his eye,
He pointed where his mother sat,
And said, 'she lives here, that is why.'

"With beaming face the mother heard,
Her mother's heart was very glad;
A true, sweet answer he had given,
That thoughtful, loving little lad.

"And well I know that hosts of lads,
Are just as loving, true, and dear,
That they would answer as he did,
' 'Tis home, for mother's living here.' "

Did it ever occur to you that home is the place for good manners? Perhaps I should say that home is the place, above all others, unless good manners are to be carried into every department of life, as should be the case; and possibly I should substitute "courtesy" for the term good manners. To me it is far more expressive, and either are more so than politeness which is cold and superficial. Teach the children to be courteous to each other no less than to their elders. This is most easily done by placing before them a good example which is far more effective than precept unless both go hand in hand. For little folks are great imitators. If when mother drops her handkerchief, father picks it up, as he is pretty sure to have done during his courtship days, the children do not fail to make a note of it in their bright minds.

In the same way, they receive lessons of thoughtfulness, and of courteous and kindly words and actions. They learn that the proper thing is to acknowledge all favors in gracious manner, to show appreciation and receive it in the same spirit. Inculcate the spirit of courtesy in your homes. Good manners should not be kept for company use only. Make them part and parcel of everyday life, that even the stranger at our gates may be blessed. To make the evenings at home attractive, let us have some good books to read and take an active part in the children's conversations. Encourage them to talk over the joys and sorrows of the day. Teach them to look on the bright side and don't let the only jolly evenings of the year be at holiday time. Make home attractive for the boys. Teach them to cultivate a spirit of patriotism and love of country and loyalty to the flag.

Handsome furniture will not, unaided, make rooms cheerful. The charm of a cozy home rests principally with its mistress. If she is fortunate enough to have sunny rooms, her task is half done. In apartments into which the sun never shines recourse must be had to various devices to make up so far as may be, for this grave lack. A sunny room should have bright and joyous color in its furnishings. Ferneries and shade loving plants may contribute their cheer to the room. An attractive room need not be too orderly. A book left lying on the table, a bit of needlework on the window-sill, an open organ or piano, may indicate the tastes and occupations of the inmates, without suggesting that there is not a place for everything in the room. A bird singing in the window, an aquarium on the table, domestic pets moving about as if at home, these give life and brightness to a home. Pictures on the walls, if selected with taste, are ever fresh sources of enjoyment. Newly painted and neatly papered rooms add much to the beautifying of the home, and this can be done with very little expense. Simplify your methods; don't try to have your rooms loaded with useless furniture to dust, clean and move about. Don't feel you must try to keep up with the constantly changing fashions. The woman with too much house is next to the woman with nerves, and she usually acquires "nerves" before she dies.

Before closing, I wish to speak of beautifying the yards, where the husband and father has his part of the work to do. Now let us take a look at the back part of the house, where the wife and mother spends most of her time, and perhaps can see nothing but old boards, rotten fences, or tumble down buildings; and if so, clear these away and plant some berry bushes, such as raspberries, blackberries, currants, or anything that will be of some use. At the same time, do not forget the summer flowers which are pleasing to the eye and a joy forever, such as pansies, china asters, scarlet sage, marigolds, and many of the old fashioned flowers that are easily raised and cared for.

Another very important thing to consider is where the slops of the house are emptied. Does the good wife empty it right out near the door, causing an unsightly, ill smelling, and disease breeding, fly collecting place, or does she have to carry it away forty or fifty steps to prevent this. If she has to do either, do not allow this to take place any longer, but dig a trench, put in some kind of tile or board drain to carry it away, and thus lighten the wife's labor and help to beautify your home.

Now, as to the front yard: the more attractive you can make it, the better. Have you shrubs growing there, if not, and you have room for them, get some, for they will add much to the beauty of the yard. I would advise having the flower beds at one side, or at least, in some place where they will not interfere with the making of a smooth velvety lawn. In this shrubs may be planted, but do not cut it for beds if you can have them anywhere else. Often two or three shrubs will produce an effect, where half a dozen would make everything look crowded and give a bad general effect. There is so much can be done to beautify a home that life in the village, or on the farm is full of joy to every normal man or woman who takes advantage of what it offers.

The PRESIDENT: We now come to the last number on the program for this evening, an address by Mrs. Mollie MacClaughy Allen on "The Sanitary Home." Mrs. Allen is a graduate of Cornell, and a practical farmer herself.

Mrs. Allen's paper was as follows:

THE SANITARY HOME.

BY MRS. MOLLIE MACCLAUGHRY ALLEN, *Oswego, N. Y.*

Sanitary comes from the Latin *sanitas*, which means conducive to health, or relating to the preservation of health. Hence the sanitary home means the healthful home. Health is, in my opinion, the thing most to be desired in this life, for with health all other things may be added; or, failing, the addition will not be missed. What are millions to one whose stomach refuses anything but a diet of toast and tea; whose nerves are racked by hours of sleeplessness? Broad acres, well-stocked, and beautiful homes matter not without that joy of living that comes from the sound mind in the healthful body. You all know the weakening effect that disease has upon the mind; I believe, nay, I know, that disease and ill-health tend to lower the moral tone no less than the mental power of the individual. Therefore it should be the most sacred duty of the wife and mother so to rule her household that they may go out to their life-work strengthened and helped by the pure, clean, healthful home atmosphere.

But how shall we do this? How keep disease at bay? We may do this in two ways: by protecting the body as far as is possible from the germs of disease; and by making the body so strong and full of vigor that it will resist the attacks of these germs.

The second question brings into discussion the question of diet, how to feed children for growth and vigor, and is too long to be considered in this little talk. So we can only discuss the question of how to protect the body from its foes. Just as the farmer wages war upon the foes of his crops and orchards, such as potato beetle and the San José Scale, so have we to fight in protection of our healthful home, the more subtile, because invisible foe, the disease germ.

All bacteria, or germs, as they are commonly called, the helpful as well as the harmful kind, are the smallest and lowest known form of living matter. They are tiny plants of the very simplest kind of construction, consisting of a single cell. They reproduce themselves by division; that is, the cell lengthens, a wall is put in, and two independent plants take the place of one. If conditions are favorable, they may do this in from 20 to 30 minutes, so you can see how enormously they can multiply in a short time. They are able to swim in liquids, but are unable to travel otherwise, only as they are blown by the wind, or carried by other bodies, such as insects, dust of the air, clothing, skirts or womens' dresses, etc. Like other plants they require food (carbon, nitrogen, etc.), warmth and moisture for their growth but they can accommodate themselves to hard times, some kinds even living in water that has been distilled. But, unlike other plants, direct sunshine is death to germs, the exposure necessary varying from a few minutes to some hours.

Since these germs reach us by means of other bodies, what is it most necessary to guard in our welfare? Insects, water, air, milk, and other foods.

As you will all probably know, it has been determined beyond a doubt that, not only that scourge of the South, yellow fever, but our own dread malaria, is caused by the bite of a mosquito bearing the germs of the disease. It is also known that the typhoid fever germ, which, I believe, can cause infection only by the way of food or drink, is often transferred to the table by the common housefly, which has come in contact with waste from the patient that has not been properly disinfected. Screens are cheap, and with a little care in seeing that they are used to keep insects outside—not inside—they will eliminate this danger. Warfare may also be waged upon these foes by depriving them of their breeding places. The eggs of the housefly are deposited in the manure piles, and at one stage of their existence the mosquitoes must have stagnant water, becoming those wrigglers so familiar to all. Do away with empty cans, broken dishes, and unfilled pools which, with every rain, form a happy home for innumerable little wrigglers. A pool which cannot be drained or filled may be covered with a thin film of kerosene; this interferes with the breathing of the wrigglers, and, as mosquitoes do not travel far from their birth-place, will lessen the number of annoyances as well as the danger.

Another source of disease should be safe-guarded in the sanitary home—the water supply. Remembering that the germ of typhoid fever and many intestinal troubles are carried by impure drinking water. Consider these few questions: Is the drainage of the land toward, or away from the well? Is your well, if a dug well, properly protected from the surface drainage by a water-tight wall and curb? Is your soil of a gravelly, leachy nature? Do you throw dish-water, wash-water, and other slops containing organic matter, near the well, to form a breeding place for the bacteria which may be washed into the well by rains? Are the outhouses provided with water-tight vaults, or otherwise arranged so that there may be no leakage to the well? Can any living animal get into the well? What kind of pump do you use, and are your utensils for water kept properly cleansed? The poetical "old wooden bucket," the "moss-covered bucket," was probably as unsanitary as anything we could imagine. Pure water supply is perhaps one of the most difficult problems, as it certainly is one of the most important. Our bodies are largely composed of water, and it should be freely used each day —outside as well as inside—to secure the best physical well-being.

Milk should form a part of the diet of the farmer, because it contains in a digestible form about 4 per cent. of the nitrogenous material that is needed to form that balanced ration that we consider so carefully in feeding our stock, but too often neglect in our own diet. But unless care is taken to have the milk pure, it becomes a menace to health instead of a beneficial food.

There is not quite the danger from impure milk on the farm that we have in the city, because it does not have to pass through the various stages of transportation and waiting that city milk suffers, but nevertheless there is much room for improvement in the cleanliness and healthfulness of much farm milk. The first thing to be sure of is that there is no disease in the herd, for tuberculosis and other diseases may be passed from cow to man by means of the milk. Then, too, when we think that the milk in the udder is free from all disease germs except those which may come from diseased cows, and that all other cases of contamination must come from the outside, it becomes merely a problem of protecting the milk from bacteria in its course from the cow to the human stomach.

This, until the milk reaches the house, must be the particular duty of the father in protecting the home. Is it necessary to repeat that the stables must be kept clean and well-ventilated, and the cows should be kept clean and well-brushed, so that the dust falling into the milk and carrying with it germs, will be lessened? It is a great help to keep the long hairs on the flanks and udders clipped, and to wipe just before milking with a cloth (dampened). Of course, the hands of the milker should be clean, and it is well to discard the first milk from the ducts, a sit has been found to be worthless, and contains germs which have entered from the outside. I might suggest, that as bacteria laden dust is heavier than air, and will settle, the use of the protected top pail recommended by the Cornell Experiment Station. They have found a wide difference in the number of bacteria in the two pails under the same conditions—thirteen hundred in the one, and three hundred and twenty in the other with one-half as large an opening. Milk should be at once removed from the stable, cooled below 50 degrees, and kept in a sanitary room; the best protection is in quick cooling and keeping cold, for we have seen that the germs require warmth for their development.

It is the housewife's care that the milk vessels should be in proper condition, and, it seems foolish I know to speak to housekeepers of something so obvious as the need of clean milk vessels. but an experience of mine not long ago opened my eyes to the fact that there may be fewer milk vessels clean and properly sterilized than we have suspected.

I was calling on one whom we have supposed to be a good housekeeper, and remarking the difficulty and time consumed in keeping a certain make of separator clean, especially when left to the care of a servant. I said mine would not keep it clean, and, in fact, I believed that it could not be kept clean, without a greater amount of labor than some other kinds, so did not intend to keep it. She replied that she had no trouble with the same make; that it took but a few minutes to wash it. I could not see how she could be so sure that there was no filth in the little depressions in so short a time, and she brought in the articles to prove her statement. In every little wrinkle one could scrape off enough to hold on the point of a pin; not much, I admit, but enough nevertheless, to form a home for hundreds of the microscopic germs. Are we careful to see that our pails, pans, creamery cans or separators, each crack and wrinkle, if you have not the smooth ones, are properly cleansed in pure water with some antiseptic such as a 2 per cent. solution of washing soda, thoroughly scalded by steam of boiling water and placed in the sunshine protected from the dust? Do we frequently boil all our strainers and other cloths in a solution of washing soda?

It would be superfluous to repeat the lessons that every child is now taught, of the necessity of a supply of oxygen to burn up the wastes of the body in the lungs, and of the necessity of getting rid, in our homes, of the resulting carbon dioxide and other impurities thrown off in breathing. In sickness, especially, every care should be taken to have complete change of air very frequently in the sick room, and in health such change will often do away with headaches, tired feeling, etc. It should be the care of the mother to see that the air is pure and this is easy enough in the summer when the doors and windows can be thrown wide to God's free air and sunshine. Be sure to have fresh air in the sleeping rooms, for there we spend at least a third of our existence. Do not be afraid of the night air; it is not so dust and germ-laden as that of the day; but if you fear the draught either summer or winter, you can try the simple little device of the muslin curtain ventilator. Just a piece of five cent muslin tacked to a frame made to fit the window, and you have free passage of fresh air and eliminate the draught. Children brought up in properly ventilated homes stand much better chance of resisting tuberculosis, which causes annually about 40 per cent. of the death rate.

The greatest danger to food is from the dust in the air and the unsanitary places in which it is stored. The refrigerator should be frequently cleaned with a solution of washing-soda, and all dark, damp corners thrown open to the light and air. All food in the process of preparation should be protected from the dust; no sweeping or stirring of the dust should be done while one is making bread, and all food should be carefully covered. As the germs grow best in the dark, let in the light; as they need warmth, let us keep the perishable food cool; as they like moisture, keep things dry.

Possibly you may think that I am trying to make work harder by suggesting such scrupulous care of household utensils and furniture. No, indeed; I would do all in my power to lighten the labors of the housewife, already over-burdened in these days of scarce and incompetent help, and will leave these few suggestions for your future reflection. Let us do away with the old-fashioned, heavy draperies and upholstered furniture that requires so much care, and use only that which will stand the sterilizing effect of the wash tub and boiler and exposure to the sunshine.

Let us do away with the carpets that are such a strain to take up and down, and make so much dust, and have rugs which can easily be carried out of doors and cleaned; then with an antiseptic solution and a mop dust may be removed without getting it into the air. It is no more work to dust the furniture with a cloth dampened in an antiseptic solution than with a dry one, and it effectually disposes of the dust laden with germs.

One more suggestion for your own health; do less baking of pie and pastry, and give your household a diet of fresh vegetables, milk, cheese, eggs and fresh fruits. Then you will have time to get out of doors yourself, and enjoy the growing of fruit, flowers and poultry, and all of the beauties of nature. The out of door life is the ideal one, to my mind, but if we cannot be out of doors, let us have our homes partake of the freshness and wholesomeness of the open air and sunshine and furnish to our children the bodily health which is the inspiration for the clean, pure development of their mental and moral natures.

The PRESIDENT: This is the end of the Womens' Session. I thank you all for your kindness.

SECRETARY MARTIN: Just a moment before we adjourn. Tomorrow morning is the closing session of our Institute. I have had one or two requests to be excused from some of the delegates. Tomorrow morning's session is one of our most important sessions. The resolutions relative to the future work will be taken up in the morning. You all want to hear what these resolutions are, and when we vote on them, we want as many of you here as possible. You will be able to leave here about twelve o'clock. There are six or seven roads leading out from here, and you will have no trouble in getting out in good time tomorrow, so I want you all to be here in the morning. We will now stand adjourned until nine o'clock tomorrow morning.

New Castle, Pa., Friday, May 29, 1908,
9 o'clock A. M.

Mr. Seavy in the Chair.

SECRETARY MARTIN: I believe the resolutions are not all in yet, so we will hear Prof. Menges before we receive the report of the Committee on Resolutions.

Prof. Menges then read the following paper:

DEMONSTRATIONS IN WHEAT RAISING IN YORK COUNTY.

By Prof. Franklin Menges, *York, Pa.*

These demonstrations were undertaken by the writer at the request of Hon. A. L. Martin to show that by careful and early plowing frequent cultivation between plowing and seeding time and the application of stable manure and the careful selection of seed year after year the yields of what may have been termed at the beginning of the demonstrations larger yielding wheats, can be still further increased. These varieties have been under observation indirectly for at least four years and in that time have yielded anywhere from 25 to 40 bushels per acre field yields. These wheats have been observed, not as much as might have been desired, in rich and poor soils and under good and poor cultivation but always with carefully selected seed. Let me place special emphasis on the fact that these observations were made with farmers who live on their farms and own them and farm them and that no observations were made on rented farms. This is not said in disparagement of tenant farmers or farming.

The farmers whose operations were under observation are not doing any fancy farming, but they are good plowers and cultivators and careful in the selection of seed. The wheat was not raised on experimental plots, but was produced in fields varying in size from six to forty acres. The manure of these farmers is not allowed to rot away in the barnyard, while it is not applied directly from the stable to growing crops as it should be, it is applied three and four times a year and in some instances more frequently so that there is little loss.

These farmers with one or two exceptions follow the four or five years rotation of grass and corn, and either wheat in the corn stubble in the fall, or oats in the spring, followed in both cases with wheat the following fall, with sometimes a second crop of wheat where a crop of oats was raised, but usually grass seed is sown with the wheat that is sown after the oats and always with the wheat sown after the crop raised on corn stubble. In every one of the demonstrations here given grass seed was sown with the wheat, the timothy in the fall and clover in the spring. Not that we approve of this method, but it is the normal way of sowing grass seed and only normal conditions were under observation.

The Department of Farmers' Institutes of the State recognize that the yield of wheat per acre in Pennsylvania is too low to induce the farmers to continue raising it, as a fairly good paying crop, while at the same time the department sees that wheat is more and more becoming the food of all humanity as civilization advances, and that it must be raised. The average yield in the State of Pennsylvania in 1906 was 17.7 bushels per acre worth $15.93 at 90 cents a bushel, which is considerable more than the average prices paid throughout the State.

The farmers whose methods have been under observation previous to the demonstrations and with whom the demonstrations were finally made are: William Dietz, Hellman, York county, Pa.; William Menges, Menges Mills, York county, Pa.; John A. Spangler, Spring Forge, York county, Pa., R. F. D. No. 2; Peter Menges, Iron Ore, York county, Pa.; John Moul, Iron Ore, York county, Pa.; Col. J. A. Stahle, York, Pa., R. F. D. No. 1; M. L. Smith, Dover, York county, Pa.; Howard Anderson, Stewartstown, York county, Pa.; H. M. Anderson, New Park, York county, Pa.

SOIL TYPES.

The demonstrations were made on the soil types most prevalent in the southeastern section of the State. The soil of William Dietz, of Hellam, is underlaid with the siluric Cambrian limestone and is known as limestown soil and by the soil survey of the United States Department of Agriculture as the Hagerstown loam.

The soil of William Menges partakes of the limestown and of the slaty soils, or it is formed from both, and therefore I suppose it would be recognized as partly Hagerstown loam and cecil loam.

The soil of John Spangler lies geographically in the Hydro-Mica schist formation and is locally known as slaty soil and by the United States soil survey as cecil loam.

The soil of Peter Menges belonges to the same formation as John Spangler's except that it is finer and may therefore be classed as a cecil clay loam.

The soil of John E. Moul belongs geologically to the Potsdam formation and locally known as stony soil and by the United States soil survey as the porters stony loam.

The soils of Col. J. A. Stahle and M. L. Smith belong to the new red sand stone and locally are known as red soils and by the United States soil survey as the Pennsylvania loam.

The soils of the farms of Mr. Howard Anderson, Stewartstown, York county, and H. M. Anderson, belong geologically to the Eozoic or dawn of life formation and are known locally as micacious loams and by the United States soil survey as the Chester mica loam.

WILLIAM DIETZ'S OPERATIONS.

In 1904 the field on which the wheat under observation was raised was in grass. In the fall and during the winter of 1904 and in the spring of 1905 this field was manured and the manure plowed down in the spring of 1905 and the field planted with corn. After the corn was harvested the field was well cultivated—not plowed—and sown with wheat and a very good yield was obtained in 1906. As soon as possible after this crop of wheat was harvested this field was again manured and the manure plowed down early in August. Between the time of plowing and seeding, the field was harrowed four times, and rolled three times or it had seven cultivations. The wheat, the Rural New Yorker No. 6, was sown October 3, 1906, at the rate of two bushels to the acre. A fertilizer containing ten per cent. of phosphoric acid and two per cent. of potash was sown with the wheat at the rate of 200 pounds per acre. The soil was in elegant condition when the wheat was sown, the seed bed as fine as a garden. The land slopes to the southeast. November the 7th, the wheat was examined. At this time it had grown to a height of from four to seven inches had stooled very little; only here and there a tiller. This wheat was again examined April 15th, 1907. At this time it had grown to a height of from 9 to 13 inches. The stools were vigorous and strong, had a dark green color, few dead leaves and a strong root system. At this time the wheat had stooled, but not more than half the stools had two tillers and but few had three.

The field was examined a third time, May 28, 1907. At this time the wheat was from 28 to 34 inches tall, had a dark green color and the stools that had two or three tillers at the first spring examination had developed only one so that approximately 97 per cent. of the stools had only one tiller and where two or more tillers developed they were shorter and not as vigorous. The root system was strong, the stems heavy so that the wheat stood well. A little early rust had appeared at this time on the lower leaves. The heads were formed but were still within the sheath and some time will elapse before they will be out. No fly had appeared at this time in this field. The field was examined the last time July 1, 1907. At this time the heads and wheat had fully developed but it was still unripe.

The heads, Mr. Deitz thought, were not quite as large as usual lacking from two to four grains. The heads on most of the stalks growing upon stools with more than one tiller were as much as an inch shorter than those growing on stools with one tiller and the straw of stools with one tiller varies in height from 51 to 56 inches, while the straw of stools with two tiller varies from 30 to 41 inches. The grains in the two and more tiller heads were also smaller and not so perfectly formed. No late mildew appeared on leaf or stem and but very little damage was done by the fly, only here and there a stalk. This wheat was harvested July 16, and was shocked in the field until thoroughly dried. The wheat was housed in a barn and was threshed August 23, 1907, and yielded 36½ bushels per acre, clean wheat. These are not drill measured acres but were surveyed by the writer.

The kernels of this wheat as they come from the cleaning mill are nearly all similar in shape and are approximately the same size. Ten of these kernels laid end to end measured two and seven-eighth inches. The color of the grains was a little dulled by a heavy rain while the wheat was in the shock. No weeds or dirt were found in the sample. No smuty or musty kernels could be found and approximately only two per cent. of the grains were damaged, some by the thresher and some shriveled. The kernels are usually plump. The bran was the least discolored by the rain already referred to but none of it was cracked or streaked so that the vitality of the wheat was not affected. This wheat weighed 60 pounds to the measured bushel.

WILLIAM MENGES.

Mr. Menges' soil is similar in formation to that of Mr. Dietz and so is the soil treatment. The sod field on which this wheat was raised was manured in the fall of 1904 and the manure plowed down in the fall. A crop of corn was raised on this field in the summer of 1905 and after the corn was harvested the stubble was well cultivated—not plowed—and sown with wheat. After this crop of wheat was harvested in 1906 the field was again manured and the manure plowed down within a week from July 20, 1906. Between the time of plowing and seeding this field was harrowed four times and rolled three times. The wheat, the old Lancaster red, was sown September 6, 1906, at the rate of two bushels to the acre with 200 pounds of a fertilizer containing 10 per cent. phosphoric acid and 2 per cent. of potash. Four days after the wheat was sown a heavy rain fell which compacted the soil some, but did not prevent the wheat from coming up regularly.

The field was examined November 8, 1906. At this time the wheat was from 16 to 19 inches tall when the leaves were drawn up to three full lengths, but was not as dark green a color as Mr. Dietz's. The wheat had stooled well having from two to three tillers to the stool. It was exceedingly heavy on the ground so that a large number of lower leaves had turned yellow for want of sunlight. The wheat went into winter in this condition and was so heavy that the field mice did some damage.

The field was again inspected April 12, 1907. At this time the 16 to 19 inch leaves had died down to from 11 to 13 inches and some even down to the stem. The color was pale green and did not look vigorous. Some of the tillers evidently the tallest and those that had grown most vigorously had been winter-killed to such a degree that at this time it seemed as if the tillers that had not made so vigorous a growth in the fall would develop into the best stools now. It was a question at this time how many of the tillers would develop. The fly had done some damage in the fall but at this spring examination it seemed about all dead. May 27, 1907, this field was again examined. At this time the color was a dark green and the wheat stood well and was strong in the stem. Approximately twenty-two per cent. of the stools had more than one tiller and these came largely from the stools that had not grown so vigorously in the fall. The straw of the stools with one tiller was from 27 to 34 inches tall while that in the stools with more than one tiller was from three to six inches shorter. The heads were formed but were still in the sheath. Little damage had been done by the spring brood of the fly up to this time. This field was inspected the last time July 2. At this time the wheat was ripening. The straw stiff and strong and none had lodged. But the stand was too thin, because the stools that had more than one tiller usually developed only one head. Some times two smaller heads developed, and sometimes a larger one and a smaller one. When there was only one tiller to the stool the straw varied in height from 50 to 63 inches and in stools with one large and one small tiller from 47 to 53 inches and in stools with two equal tillers from 47 to 48 inches. The heads on the stools with more than one tiller varied in length from one and a half to two and a half inches, while those on the one tilled stools were from 3½ to 4 inches long. The grains in the larger heads were plump and large and the grains in the smaller heads were smaller. The spring brood of flies did little damage to this wheat, only here and there a stalk. This wheat was harvested July 16, put in shock until thoroughly dried and was housed in a large barn and threshed August 30, 1907, and yielded 31 bushels cleaned field yield per acre. 98 per cent. of the kernels were similar in shape, the color, the bright and clear color of red wheat. The size of the kernels was fairly uniform. Ten grains of an average sample laid end to end, measure two and five-eighth inches. There are no weed seeds and dirt in the cleaned wheat as it was used for seed. About two per cent. of the grains are damaged by the thresher, 98 per cent. of these grains are plump. The bran was not discolored or withered neither was it cracked or streaked so that the vitality of the seed had not been affected. A measured bushel of this wheat weighed 62 pounds.

The field used for this demonstration, as already stated, belongs to the cecil loams and received the following treatment: In the fall of 1903 it was a sod field which received an application of manure which was plowed down the same fall. Two successive crops of corn were raised on this field in 1904 and 1905. Before plowing the field in the spring of 1905 for the second crop of corn, it received another application of manure which was plowed down. After harvesting the corn in the fall of 1905 the field was plowed and sown with wheat. After harvesting this crop of wheat the field received a third application of stable manure which was plowed down July 10 to 12, 1906. Between the time of plowing and seeding this field was harrowed seven times and rolled twice. There was an elegant seed bed as fine as a garden. Five hundred pounds of prepared lime per acre were applied before the first cultivation.

The wheat, the old Lancaster red bearded, was sown September 10, 1906, at the rate of one and eighty-five hundredth bushels to the acre, with 225 pounds of a fertilizer containing eight per cent. phosphoric acid, one per cent. of potash and a half per cent. ammonia. The wheat came up regularly, though a heavy rain fell the day after it was sown. This field was examined November 8, 1906. At this time the wheat was from 15 to 18 inches high, when the leaves were stretched to their full height. It had stooled well, averaging from two to three tillers to the stool. The stools were well developed and had a dark green color. The fly had done a little damage.

This field was again inspected April 12, 1907. At this time the 15 to 18 inch wheat had died down to from 9 to 14 inches and some leaves were dead to the stem. This field was exactly like William Menges' and to describe it would be simply repeating what I said there. It yielded 31½ bushels to the acre, field average, and the condition of the grain was the same as William Menges.'

JOHN A. SPANGLER.

Mr. Spangler's soil belongs to the cecil loams, the same as Peter Menges, though not as fertile. The soil treatment is quite similar. The field on which this crop of wheat was raised was manured on the sod in the fall of 1904, and the manure plowed down that same fall. A crop of corn was raised here in the summer of 1905. After the corn was harvested the field was cultivated and sown with wheat. After this crop of wheat was harvested the field received an application of six tons of stable manure which was plowed down July 15 to 17, 1906. The field was rolled and harrowed twice and the wheat, the old Lancaster red, sown September 20, at the rate of two bushels per acre with 200 pounds of a fertilizer containing 8 per cent. phosphoric acid, one per cent. potash and one per cent. ammonia. The day after the wheat was sown a heavy rain fell which formed so hard a crust that the wheat germs had difficulty in coming through, but it came up better than another variety of wheat sown beside it. This field was inspected November 8, 1906, and the wheat was then 6 to 10 inches tall and had began to stool. The field was again examined April 12, 1907. At this time the wheat was from 8 to 12 inches tall and had been winter-killed very little. The tillers that had started in the fall had grown considerably by this time and the stand was fair. The field was again examined May 25. At this time the wheat was from 27 to 35 inches tall but only about 23 per cent. of the tillers had developed and then not as strongly as might have been desired. The heads were formed but were still in the sheath.

The field was examined for the last time July 2, 1907. All the tillers that had developed, and there was usually only one to a stool, stood well but the stand should have been fully one-third heavier. The straw was from 36 to 52 inches tall and the heads were fairly large and well filled but there was not enough of them. This wheat was harvested July 16 and 17 and shocked in the field until thoroughly dry and stored in a large barn and was threshed August 18, and yielded 25 bushels per acre. 98 per cent. of the kernels of the clean wheat as it was to be sown were similar in shape and practically the same size. The color of the kernels was clear and clean, and the hardness indicates that the wheat is high in gluten. Ten average grains laid end to end measured 2¾ inches. No weeds and dirt were found in an average sample. Only about one per cent. of the grains were damaged by the thresher and there were no smuty or musty grains and 98 per cent. were plump. The bran was not cracked, withered or streaked, showing that the vitality was not injured. A measured bushel of this wheat weighed 62 pounds.

JOHN E. MOUL.

The soil of Mr. Moul's is located in the Potsdam formation and locally is known as stony land and by the United States soil survey as Porters stony loam. This field was planted with corn in the spring of 1905. It did not receive any manure at this time nor at any time previous to this so far as the owner knows. After the corn crop was harvested the field was cultivated and sown with rye. With the rye 200 pounds per acre of a 14 per cent. South Carolina rock was sown. The rye yielded fairly well. After the rye was harvested the field was plowed August 15, 1906. August 30, the field was limed at the rate of 60 bushels to the acre on the plowed ground. The ground was harrowed twice and then the wheat, the old Lancaster red, was sown September 15, at the rate of two bushels of seed to the acre, and with the wheat 200 pounds of bone meal containing four per cent. potash. The wheat came up well considering the soil cultivation which was poor. The field did not receive any stable manure at this time. This field was inspected November 8, 1906. At this time the wheat had attained a growth of from 8 to 12 inches in height and had stooled fairly well, three tillers in most stools. It seemed that the fly had been doing some damage but few flies could be found. This field was examined April 12, 1907. At this time the wheat was from 10 to 13 inches tall but was not as vigorous as it should have been. The three tillers were still persisting. A large number of the longest leaves of the previous fall had been winter-killed.

The field was again examined May 25. The stand at this time was uneven and patchy. On about half of the field the straw had attained a height of from 18 to 21 inches, while the other half was from 27 to 30 inches. The stools with two or three tillers on both sections of the field were shorter and weaker than the stools with one tiller. In the two and three tiller stools the heads were not fully formed in the sheath while usually in the one tiller stools they were. Some flies were present but the extent of the injury could not be determined at this time. Some rust had also appeared and done more damage than in any other case. The field was examined for the last time July 2, 1907. The stand was poor, only a few of the stools with two and three tillers developed more than one head. The tillers with heads varied in height from 32 to 50 inches; the heads were smaller than is usual for this wheat. The fly had affected at least five per cent. of the stalks. The seed was exactly the same as that used in the three previous demonstrations, but the soil culture was poor, no stable manure was applied and all the fertility was supposed to be furnished by means of commercial fertilizer. The wheat was cut July 17. After thorough drying in the shock it was stacked in the field and threshed early in September, yielding 17 bushels per acre.

Ninety-eight per cent. of the kernels of this wheat in the condition in which it was sown were similar in shape and practically of the same size. The color was the bright and clear color of red wheat and the hardness such as to indicate a large percentage of gluten.

Ten grains laid end to end measured two and three-fourth inches. No dirt or weed seeds were in the samples. The grains were plump. Few grains, not more than one per cent., were damaged and there were no smuty or musty grains. The bran was not cracked or withered. A measured bushel weighed 63 pounds.

M. J. SMITH.

Mr. Smith's farm is situated in the new red sand formation and is known by the United States soil survey as the Penna. loams. On the sod of the field used for this demonstration ten tons of a mixture of horse and cow manure were applied in the fall of 1904. This manure was plowed down in the fall. In the summer of 1905 a crop of corn was raised in this field. After the corn was harvested the soil was well cultivated and sown with wheat in the fall of that year. This wheat was harvested in 1906 and the field manured and the manure plowed down the middle of July. It was harrowed four times and rolled three times between plowing and the time of sowing. Three hundred pounds of undissolved raw bone per acre was applied with the drill before sowing the wheat. The wheat, the harvest king, was sown September 21, 1906, at the rate of one and seven-eighth bushels to the acre, and with it 275 pounds of a fertilizer containing two and a half per cent. ammonia, five per cent potash and eight per cent. phosphoric acid. Soil culture very good This field was examined November 9, 1906. At this time the wheat varied in height from 8 to 10 inches. There had been some stooling, but the tillers had not developed as much as might have been desired. The field was again inspected April 13, 1907. At this time the wheat was from 9 to 11 inches tall and the tillers had grown nearly as tall as the original stalks, strong and sturdy. The field was again inspected May 27. At this time the stand was as even as if shorn off to make it even, and was nearly all 28 inches tall. Fully half of the wheat had stooled and there was little if any difference in the height of the tillers growing from stools having two or three tillers and those having only one. The leaves on this variety of wheat are strong and large and have a dark green color. The heads were all formed in the sheath. No damage had been done by the fly up to this time. The field was examined the last time before cutting the wheat July 1, 1907. The straw was not as long as it might have been, varying in height from 43 to 46 inches. There is little difference in the length of the straws of the stools that have two or three tillers and those that have only one, neither is there an appreciable difference in the size of the heads, nor in the grain in the heads. The fly had done but very little damage. This wheat was cut July 12, was put in shocks in the field and housed in a barn and was threshed August 8, and yielded 32 bushels to the acre field yield.

The kernels in the wheat, as it was used for seed were approximately all the same shape and size, had a clear bright wheat color. Ten average kernels when laid end to end measured two and three fourth inches. There was no dirt or weed seeds in this wheat and no smutty or musty grains; 99 per cent. of the grains ware plump. The bran was not cracked, streaked or withered and therefore the vitality will likely be good. A measured bushel of this wheat weighed 61 pounds.

COL. J. A. STAHLE.

Col. Stahle's soil is exactly the same as M. L. Smith's but the soil treatment somewhat different. Col. Stahle does not follow the four years or three years or any definite rotation. The larger field under observation was manured on the sod in the fall of 1904, and the manure plowed down the following spring. A crop of corn was raised on this field in the summer of 1905. After harvesting the corn the field received another application of manure which was plowed down and the field planted with potatoes in the spring of 1906. After the crop of early potatoes was harvested the field was plowed and between plowing and sowing of wheat the field was harrowed six times and dragged once or twice. The soil was in elegant condition. The wheat, the Turkish Roumanian, a bearded variety, was sown September 16, 1906, at the rate of two bushels to the acre, with 200 pounds of a fertilizer containing 2 per cent. nitrogen, 10 per cent. phosphoric acid and 8 per cent. potash.

In another field under observation four crops of early corn were raised in succession. This field was manured every year after the corn was harvested and the manure plowed down and the soil well cultivated. In the late summer of 1906 the field was again manured and the manure plowed down, and the field sown with wheat at the same rate of the same variety of wheat per acre; and the same quantity of a fertilizer of the same composition as the one already given. This wheat was not examined until July 6, 1907. At this time the wheat was beginning to ripen. The wheat had stooled well having mostly two tillers to the stool. The length of the straws of the one tiller and the two tiller stools varied very little, neither did the size of the heads vary. The length of the straw varied from 53 to 62 inches on the field in which potatoes were raised and from 45 to 52 inches on the field where corn was raised four years in succession. This wheat was cut from the 17th to the 20th of July and shocked on the field and housed in a barn and threshed the middle of August and yielded 52 bushels to the acre field yield, while that in the other field yielded 32 bushels to the acre field yield. About four per cent. of the kernels are smaller and not of the same shape as the rest of the sample. The color was not as bright as it should be, whether this is a characteristic of the variety or is due to heating after housing, I do not know. Ten average grains of this wheat laid end to end measured three inches. All but four per cent. of the grains were plump. There were no weeds or dirt except an occasional grain of cockle. There were no smutty or musty grains. The bran is not streaked or cracked, but was not as bright as it should be. This wheat weighed 63 pounds to the measured bushel.

H. M. ANDERSON.

This soil belongs to the Mica loams and by the United States soil survey are called the Chester Mica loams. The field used for the demonstration was manured on the sod during the fall and winter of 1904 and 1905, and the manure plowed down in the spring. A crop of corn was raised in this field in the summer of 1905, and in about half of the field with the corn at the last cultivation, crimson clover was sown. A good stand was secured which wintered well. The other half of the field after the corn was harvested lay bare until the spring of 1906, when it was plowed and sown with oats. After the oats was harvested the field was manured and the manure plowed down the last week in July. Between this and the time of seeding the field was harrowed four times and rolled four times. The wheat, the four rowed Fultz, was sown September 27, at the rate of two and a fourth bushels to the acre. Before sowing the wheat 285 pounds per acre of a fertilizer containing 2¼ per cent. of nitrogen, 12 per cent. phosphoric acid and 8¾ per cent. of potash was applied, and with the wheat 215 pounds per acre more of the same composition or an application of 500 pounds of fertilizer per acre. The crimson clover on the other half of the field was plowed down early in May and a second crop of corn, silage corn, was raised here. After the corn was cut and removed the field was manured and the manure plowed down, the plowed ground harrowed once and the wheat, the same variety and quality with the same amount and composition of fertilizer was sown, the 1st of October, same as the other part of the field. This field was examined November 15, 1906. At this time the wheat on the corn stubble looked better and was a little taller than the wheat on the part of the field on which oats was raised. The wheat was from 8 to 8½ inches tall on the oat part of the field and 9 inches on the corn part. The field was again examined April 15, 1907. At this time there was little if any difference in the two parts of the field. The wheat varied in height from 7½ to 10 inches. There was little or no stooling at this time. The color was a dark green and there was very little winter-killing of the leaves.

The field was again inspected May 28. At this time the straws were from 24 to 33 inches tall, the stems were dark green in color and vigorous. The wheat on the part of the field that had been in corn was not quite as great in height as the wheat on the part of the field that had been in oats, carrying from an inch to an inch and a half. The wheat did not stool. This field was inspected the last time July 3, 1907. The wheat on the oat part of the field stands well, the straw was strong, varying in height from 35 to 55 inches, not as tall as might have been expected. The heads on the taller as well as on the shorter stalks were well formed and were square having four rows of seed and at intervals seeds sticking between these rows. The straw in the part of the field where a second crop of corn was raised was on an average of three inches shorter than the straw on the oat part of the field, neither were the heads quite as large. The question naturally arises why this difference? In explanation, I will say that a wagon way was cut through the corn to haul the manure on the oat stubble. When the oat ground was plowed this wagon path was also plowed and when the soil was cultivated this road was also cultivated, but was not sown until the wheat was sown in the corn ground. During the entire season of growth the wheat on this wagon way performed exactly as did the wheat on the oat section. It seems here is the explanation of the difference in cultivation the thing which through all these observations has been showing its effects This wheat was harvested July 19, and thoroughly cured and when threshed, that part of the field on which the ensilage corn was raised yielded 24 bushels to the acre, and the part on which the oats was raised and which had been plowed early and cultivated frequently before seeding yielded 39½ bushels of clean wheat to the acre weighing 61 pounds to the bushel

The kernels of the wheat as they were used for seed were practically all of the same size and shape, bright and clear in color. Ten average grains of this wheat laid end to end measured 2⅝ inches. The vitality was in no way affected.

HOWARD W. ANDERSON.

The soil belongs to the same formation as H. M. Anderson, and therefore, needs no further description. The soil treatment is, however, a little different. The field on which these observations were made contains forty acres. The previous crops raised on this field were a little diverse, no definite rotation was followed. On a part of the field a crop of barley was raised followed with wheat, then a second crop of wheat which is the crop under observation. Another part of the field was in corn in 1905, followed with a crop of oats in 1906, and then with the wheat under observation. A third part of the field was in corn followed with potatoes then by the crop of wheat under observation. Another part of the field was in strawberries, these were plowed down in the summer of 1906, followed with the wheat under observation. The corn received an application of stable manure on the surface before the corn was planted. The potatoes received an application of manure and so did the strawberries. The part of the field sown with barley was limed at the time the barley was raised. The strawberry field received an application of wood ashes. This entire field was plowed six to seven weeks before seeding and each days plowing was rolled that same day. The field was harrowed six times between plowing and seeding and rolled twice with a hollock weeder attached to the roller, most of the time. The wheat, the four rowed Fultz, was sown September 21 to 24, at the rate of 2 bushels to the acre with 500 pounds per acre of a fertilizer containing 1½ to 2½ per cent. nitrogen, 8 to 10 per cent. phosphoric acid and 5 to 7 per cent. potash. The seed came up regularly. This seeding was examined November 15, 1906. At this time the wheat was 8½ inches tall and stood well but little or no stooling had taken place. The field was again inspected April 15. At this time the wheat was from 9 to 11 inches tall, it had been but slightly affected by the cold of the winter and had a dark green color but had not stooled to amount to anything.

The field was again examined May 28, 1906. At this time the straw was from 20 to 33 inches high. This difference in height made the field look patchy, except the strawberry field, where the wheat was 40 inches tall. Stools of two tillers were hard to find. The heads were all formed and ready to head out. The wheat stood well and thick enough on the ground. The field was examined for the last time July 3, 1907. At this time the wheat was beginning to ripen and was from 40 to 55 inches high in the three sections of the field where the barley, oats and potatoes were raised, while in the strawberry field it was from 50 to 60 inches tall. The heads were well formed and square and well filled. The fly did very little damage, though it was found here and there. This wheat was harvested from July 18 to 24, and was threshed the beginning of September and yielding 40 bushels to the acre field yield.

OBSERVATIONS.

In regard to early seeding, we notice first, that the wheat of Mr. Dietz sown October 3, was, when examined November 7, only four to seven inches high while that of William Menges was from 16 to 19 inches high. When these fields were again examined in the spring Mr. Deitz's wheat which was only four to seven inches high had attained a height of from 9 to 13 inches, while that of Mr. Menges was winter-killed down to from 11 to 13 inches. During the entire season Mr. Dietz's wheat was more vigorous and made a yield of approximately five bushels more to the acre. Another thing we noticed especially that Mr. Spangler, with practically the same soil treatment so far as plowing and the application of stable manure and fertilizer are concerned, but with only two cultivations just before sowing the wheat and none between the plowing and the time of sowing has a yield of 25 bushels to the acre, and Peter Menges with the same kind of soil and but with a cultivation every week at least between the plowing and seeding time has a yield of 31 bushels to the acre.

Another thing we notice in the case of Mr. Moul. He applied larger quantities of a higher grade of fertilizer, together with lime on a soil that when it receives the right kind of treatment produces the highest grade of wheat in our section. Mr. Moul gives his field two harrowings, applies a stable manure and with the same well cleaned seed from which Menges' get 31 bushels to the acre he gets seventeen.

A fourth thing we noticed in the field of Mr. H. M. Anderson, that part of the field which was plowed early and cultivated at least once and some times twice a week between plowing and seeding time, and also the wagon path through the corn field, yielded 39½ bushels to the acre, while that part of the field which was plowed the day before seeding, and which had plowed down into it a crop of crimson clover, and received the same amounts of commercial fertilizer and the same quantities of stable manure yielded only 24 bushels to the acre or 15½ bushels less than the other part of the same field plowed early and cultivated often. I might say here in further explanation, that the fall of 1906 was very favorable for growing wheat with us, while during May and the early part of June of 1907 the weather was very dry and this was the time in which the wheat sown on the silage corn part of the field fell behind.

The soils on which these yields of wheat were produced were barrens of York county, but today under the high degree of cultivation, the judicious use of stable manure and the application of commercial fertilizer, they now yield crops that few of the farmers in the lime stone valleys of York county equal.

These farmers have not done anything phenomenal and not anything that well nigh every farmer in the wheat growing sections of this State can not do by early plowing thorough cultivation, the application of stable manure not too early, seeding and the careful selection of seed.

WEATHER CONDITIONS.

The following weather conditions prevailed during the time the wheat was growing: During September, 1906, there was a mean or average temperature of 69.2 degrees, 3.9 degrees above normal. During October, the average temperature was 54.8 degrees, 2.1 degrees above the normal. During November, the mean temperature was 43.2 degrees, 1.7 degrees above normal. During December, 1906, the mean temperature was 35.5 degrees, 4.40 degrees above normal. During January, 1907, the mean temperature was 33.2 degrees, 4.0 degrees above normal. During February, the mean temperature was 23.4 degrees, 3.4 degrees above normal. During March, the mean temperature was 42.8 degrees, 3.2 degrees above normal. During April, the mean temperature was 46.2 degrees, 2.9 degrees below normal. During May, the mean temperature was 57.5 degrees, 3.9 degrees below normal. During June, the mean temperature was 64.3 degrees, 4.6 degrees below normal, and during July the mean temperature was 73.3 degrees, 0.9 degrees below normal. We find from this that the temperature from the time the wheat was sown until it was harvested was 3.6 degrees above normal and that this excess of temperature was largely due to the warm December, January and March and that there was deficiency in temperature during the months of growth namely April, May, June and July. I really believe that if the weather had been a few degrees warmer during May and June that the tillers in most of the stools would have developed better and the yield of wheat would have been larger.

There was a rain fall of 2.08 inches during September, 1906, a deficiency of 2.05 inches. During October 6.52 inches fell, an increase above normal of 2.36 inches. In November 1.72 inches fell and there was a deficiency of 1.77 inches. 7.04 inches fell in December, an increase above normal of 2.40 inches. During January, 1907, 4.28 inches, 0.72 of an inch above normal. In February, 2.39 inches fell, a deficiency of 1.78 inches. During March, there was a rainfall of 2.02 inches and a deficiency of 3.18 inches. In April, 2.92 inches fell with a deficiency of 0.87 of an inch. During May, 4.59 inches with a deficiency of 0.28 of an inch. In June 6.66 inches fell, an increase above normal of 1.60 inches, and in July, 7.83 inches fell, an increase of 2.32 inches above normal. From this we find that there is a deficiency in rainfall of a half an inch, and farther, that the deficiency in rainfall occurs largely during the growing months, namely March, April and May and September. So that these farmers had only normal weather conditions to produce this yield in wheat.

SECRETARY MARTIN: My friends, at the closing session of this Institute, we find ourselves very much crowded. We have before us the addresses of Dr. Gay and Dr. Conard, both gentlemen whom we have been waiting to hear, and twelve o'clock approaching. I would suggest that the Resolution Committee take about ten minutes now, and then we proceed with the regular program.

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. Gooderham, Chairman of the Resolution Committee thereupon read the following resolutions:

WHEREAS: We have long realized that we have had in our Deputy Secretary of Agriculture, Hon. A. L. Martin, a man especially fitted for the many responsibilities and varied duties of his office; we are again forcibly reminded by reason of the great success of the past two years' work, of the watchful care and supervision exercised by him for the welfare and advancement of Agriculture in this Commonwealth, and trust that he may be spared to us many years to continue in this work.

We also share his enthusiasm in the work and appreciate the success attending the introduction of the "Movable Farm Schools," which are the High Schools of the Farmers' Institute System, and we pledge our hearty support and co-operation in organizing such schools wherever the conditions would seem to be favorable, thereby renewing our hearty co-operation.

We further ask of the next Legislature an increased appropriation of not less than $50,000 for the carrying on of this important work.

WHEREAS: The growing intelligence of the farmers of this State demands that our Institute lecturers should be men and women thoroughly equipped to impart such knowledge as advanced conditions demand,

RESOLVED: That we urge upon the Institute lecturers the necessity of a more complete preparation and that we endorse any action that may be taken by our Director to secure this end.

RESOLVED: That we heartily appreciate the hospitality extended to us by the people of New Castle, and that we especially express our thanks to the Hon. Wm. E. Porter, President Judge of Lawrence county, for his eloquent and kindly address of welcome; to the Board of County Commissioners for granting us the use of the Court House, and that we also extend our thanks to the newspaper press of New Castle and Lawrence county in their effort to make this meeting a success, and the interest shown in the proceedings.

That we express our gratitude for the courtesies shown us by the Trolley Company, and by David Jamison, President, and the other members of the Automobile Club; and that we give expression to our appreciation of the valuable work done by the special instructors and speakers, who by their able addresses contributed so largely to the success of the Institute, and

Our special thanks are due, and are hereby extended to Samuel McCreary, Chairman of Lawrence county, our old friend and co-worker, who, by his untiring efforts, hard and continuous work, has so efficiently contributed to the comfort of all who attended this Institute.

H. M. GOODERHAM,
MATTHEW RODGERS,
M. M. NAGINEY,
HENRY W. NORTHUP,
R. F. SCHWARZ,
L. W. LIGHTY,
M. E. CONARD,
Committee.

The CHAIR: What shall be done with this report?

MR. CLARK: I move the adoption of the Resolutions as read.

This motion was properly seconded, and carried in the regular way.

The CHAIR: We will now proceed with the program. The next number on the program is an address by Dr. Carl W. Gay of the State Livestock Sanitary Board, on "The Market Types of Horses."

Dr. Gay made the following address:

THE MARKET TYPES OF HORSES.

BY DR. CARL W. GAY. *Philadelphia, Pa.*

Since this subject has been announced, there has been issued by the Illinois Experiment Station a bulletin, which treats of this subject so extensively that I almost hesitate to take it up. If you are familiar with it, I will be able to tell you nothing new, and if you are not familiar with it, I would commend it to you. It is on the "Market Types of Horses," and it is a very excellent thing.

Perhaps some of you recall from your own experience, a horse that was sold either by you, or in your neighborhood, at an ordinary market price, and later came reports of the fabulous price at which the horse was sold later. I have known cases of this kind, and have in mind one case where a horse was put on the market and sold for $149, and re-sold later for $5,000; of another where a horse that was sold for $200, originally, was re-sold afterwards for three times that amount. In fact, there are men who make it their business to buy horses at reduced prices, where the breeder is obliged to sell them, and then sell them to the consumer at the best price. And yet there is good reason for this; these men take these horses out of the bush, bring them up to where they can obtain the price for them, and they are entitled fairly to what they can make on them. The man who breeds the horses is usually the man who makes little out of them; the man who handles them is the man who makes the margin on them, and I believe the reason is that the men who breed these horses are not familiar with the details of horses. Horses will often not make as much money within thirty per cent. for the man who breeds them as they will for the man who buys them. In fact, they may turn the money several times. Now, the man who produces this class does not discriminate. He goes on the principle, very often that "pigs is pigs." These are the men that will pay four dollars service, and breed to any old mare. They think all they have to do is to breed horses in order to sell them. You know the fallacy of this course. If you want to make money out of horses, you have got to breed what the people want.

It seems to me that the reason for this state of affairs is lack of appreciation of details in horses. There is as great a difference in the variety of market horses as there is in the horses themselves. There are details that make horses adapted to different kinds of work, and of these details the breeder is too often ignorant. That is why I have chosen this subject.

The farmer is the producer, and the great supply of market horses comes from the farm, so he is the man directly concerned. My idea is to have him inform himself in regard to the market requirements, so that he will not be obliged to sacrifice his horses to the middleman. The market is simply the medium for exchange of commodities, and in this case the horse is the commodity. The type of horse is usually distinguished by certain characteristics, and it is the sum total of all these characteristics that produces the type. Then the producer has to breed to type, according to the type he wants to produce.

In breeding market horses the breeder should know what the market demand for that type is. Now, we find horses coming to market graded. The origin of this graded class is something like this: There comes a certain demand for horses to perform a certain line of service, such as move a heavy van with its contents, in the city, draw a coach or carry a rider on his back. Now, the coach or saddle horse could not drag the heavy van, hence comes the demand for a different type of horse, and we get the heavy draught horse. From the large jobbing houses of the city comes the largest demand for this type of horse. They want a horse which combines strength to drag heavy loads over the slippery streets, with some style and flash. Then we have the heavy harness horse, the coach or carriage horse, and then the class best adapted to the speed type, the saddle horse. There are no fashion plates issued, but each of these classes has its own peculiar style, and the horse best adapted to the special purposes for which they are wanted, are the horses the market demands.

The draught horse has to have weight to hold his footing on the slippery pavements, while drawing heavy vans. These horses are low-set, short-legged, very deep back, massive; horses of power, rather than horses of speed. The horses that fulfil these requirements will go to market classified as draught horses.

These draught horses are subdivided into several classes. First come the feeders. You will find that this is a type of horse that is actually in demand, and we have a good many come into this State. In Lancaster county, for instance, where they have lots of land, this class is much in demand, and they pasture them there in large quantities. The only difference between the feeder and the draught horse is merely ninety days' rations. He is the same as the draught horse, only thin.

Next come the loggers. Draught horses must have some quality and some finish. He works in the city, and must make some show. He must be smooth, and of good quality, to maintain the dignity of the draught horse. Now, when a horse of this type comes to market a little low spread and plain about the head and ears, lacking the quality and refinement of the draught horse, although of the same type, he must go back to the lumber camps, where strength is needed, and appearance does not count for so much.

Then come the chunks. Draught horses weigh at least sixteen hundred pounds, and in the Chicago market any draught horse that weighs less than sixteen hundred pounds is called a chunk. The fancy ones come East, either to Boston, or for export.

Next, in this same type, we have the expresser. He comes nearer the general purpose horse of the farm than any other horse on the market. There is no such thing as the general purpose horse known on the market. A horse, when he comes to market, must come under some particular classification. All horses are wanted for some special purpose, and are fitted up for that purpose. Now, the expresser has more style than the draught horse proper, and more power than the coach horse. He is really a draught horse with a coach horse finish, but he has more quality than the draft horse. He is a horse who can take hold of a good load and step away at a good speed.

Then come wagon horses, used for omnibuses, delivery wagons, and vehicles of the plainer sort. In regard to these horses there is the greatest difference in the market demands of the different cities. The Pittsburg market calls for a very different horse than the Boston or Chicago market. They include the farm workers, rather on the massive order from these other types.

Father down in this class we come to what we call the scrubs and plugs. Now, a scrub is a horse that has never been anything, but the plug is a horse that deserves our deepest sympathy. He is a has-been. He should be protected by law, as in Massachusetts. At the Bull's Head, in Philadelphia, these horses are sold from $27 to $60 each.

Then we come to the heavy harness horses—the coach horse and the carriage horse. The carriage horses stand about sixteen hands high, and weigh about twelve hundred pounds or over. He is rather a flashy horse, with some substance and quality. The Doctor's carriage or the brougham is the place for him.

The other type of the heavy harness horse is what is known as the "Park Horse." The coach horse is usually driven by a groom, but the park horse is driven by the owner on parade. General appearance is the thing required in the Park horse. He must be flashy, trappy, with lots of style and go. He should be well-mannered, thoroughly accustomed to motor cycles and automobiles, and never move an ear when they go shooting past. He has the neatest of hocks, and makes the road look full of horses, as the horsemen say. He runs under fifteen hands, and has a little more quality and snap than the coach horse, and not so much substance.

Then comes the light harness or speed horse. He is angular and lithe, and belongs to the speed horse class, except in lifting his knees high, and he reaches out and extends himself. He is a road horse of the speed horse type. The difference is simply a matter of degree in speed. If you buy a road horse, and he makes 2.10, he goes into the speed class and if you buy a trotter, and he cannot step over four minutes, he goes into the road class.

Now we come to the last of the great market types, the saddle class. This is usually made up of the Kentucky saddle horse, the American five gait horse, and the hunter; with speed enough to follow the hounds, he must still be able to carry well a weight of two hundred pounds and jump a fence with it. These are divided into three grades, light, medium, and heavy.

In a general way these are the three great classes of horses. Now, there is just one other class which I have to mention, although I would rather not. That is an unclassified class. I know a man in Iowa who will buy any horse he can find, and when he gets them into the Chicago market he sorts them out. Now, if you should do the same thing, and are not well informed respecting this class, you will find when you get into the Chicago market that probably one half of these horses will not fit into any class. They will have to go on the remnant counter. Following the market reports —I take Chicago because it is the greatest horse market in the world —and you will find that the horses that stand at the top of the market are all classified horses. The low selling horse is the unclassified one. It seems to me that that is reason enough why you should get horses that will classify, and not put on the market horses that will sell at a marked down price.

In addition to getting classified horses, there are certain other things I want to talk to you about for a few minutes. First, the greatest test to consider in this breeding to type which I have referred to is trueness to that type. Then comes the question of fatness. Maybe you would not buy a fat horse; I would rather not, but if you get a market horse, and expect some one else to buy him, you will find that nine men out of ten want a fat horse, and you are standing in your own light if you put on the market a horse so thin that he will sell so far below what he is really worth that some one else can afford to buy him at a low price, and ship him to Ohio, feed him from three to six months and ship him back to market, and make a profit on him. You can easily make corn pay you a dollar a bushel if you fed up a horse. Snyder in Ohio paid $300 for a thin gelding in Chicago last fall; he evidently thought he had a topper in that horse. He took him to Millersburg, Ohio, and fed him, and sent him back to market with the expectation of making a profit on him.

The next thing is manner. A horse only half broke never sells for what he is really worth. He may run over the ring all right, and may get through the two days successfully, but the chances are that he will not, and first impressions always count. I know a dealer in Ohio who has his stables back behind another barn, and you never get into the stables. When a buyer comes there, the horse is led gently round the barn, and he sees him at his best. His theory is that if the buyer sees the horse snorty and keyed up, he will not want him. First impressions always count. Get a judge to look at your horse by himself, when he has no chance to compare him favorably or unfavorably with other horses and you will make an impression that he will never forget. It is the same way with selling. If you can make the first impression a good one, you may rest assured that it will last, and if the horse is anything like what he wants, you have made the sale.

Then there are a number of minor things that help to determine the sale. Age is one of them. A horse sells at his best from five to eight years old. Draught horses will measure about a year older than they really are, and it may easily be that a three-year-old when he comes to market will more readily make a sale than a five year old. Four is a bad age to sell. On the other hand, when a horse passes eight, he does not sell to good advantage.

Another thing is color. Certain colors are more favored than others. In draught horses gray is the color most in favor. I have had buyers tell me that they will pay from $20 to $25 more for a draught horse in gray than any other color. In fact, you could not hire some of them to take an other color. In Percherons, gray and black are the predominating colors. Even if they have a black stallion they want the geldings gray, and it has been claimed that a black horse will get more gray ones out of a colored mare than a gray horse would, and for a while there was a large demand for black stallions, but the day of the black horse is waning, and they are gonig back to the gray.

In heavy harness horses, dark solid colors, black, bay and brown are most called for. The sporting tandem creates a demand for the piebald horse, with white markings, but the solid colors are most favored; also the dark colors. In saddle horses it does not make so much difference, although in this class also, dark, solid colors prevail, unless the horse is wanted for some special purpose.

The next thing is sex. As a rule, the gelding will outsell the mare. At certain seasons of the year there is a demand for mares in foal, but take the market the year round, the gelding will outsell the mare.

The next thing is breed: the average man does not care to breed to type so long as he gets what he calls a good breedy horse; it does not make any difference what blood that breed comes from, so long as it fulfills the market demands. Now, that is a mistake; it is always wise to breed to the type.

The last thing is the matter of soundness, and that is one of the most important, because there are too many horses that just suit the market that fail in selling because of some slight unsoundness. I don't mean absolute unsoundness, but just some slight defect that will prevent him from being sold. A horse will sell according to the way he is warranted, and very few men will sell a horse as absolutely sound. Most men will sell him as serviceably sound; others sound to wind and work; others "legs go." If you buy a horse warranted in that way, you can never return him for any unsoundness in the legs. The last warrant that goes with a horse is "sound to halter." You may expect to find almost any form of unsoundness in a horse warranted "sound to halter." If you take a horse to market, you must warrant him just as he is. If you breed your horses so as to conform to the market types, and are able to give them the right guarantee, there is no reason why you should not be successful, and make money out of your horses. Breed as far as you can to the prevailing dark, solid colors, with the exception of the draught horse, in which gray is the most favored color; breed geldings; breed horses you can warrant sound, and above all, do not breed anything that has to go on the bargain counter.

MR. BRODHEAD: Doctor, in a community where they have been using the Percheron, and after they have bred that line up to a certain extent, it is decided to introduce the Shire; would it be advisable for the breeders who have been breeding to the Percheron to use the 'shire? Would they gain or lose by it?

DR. GAY: My observation has been that that has been the great trouble in Pennsylvania right along, doing what you refer to. I am not here to advocate any particular breed. I don't recommend the Percheron overthe 'shire horse, but when they mix the breeds they are doing the worst possible thing they can do. You take the older breeders, and you will find that they had an ideal breeding horse for four generations. If you set your ideal, try to breed up to it, and do not go off along some other line; if you do, you will lower the standard and the type, instead of building up to it. You breed a Percheron until you have fifteen-sixteenths blood, and then you breed that mare to a 'shire horse, and, in another generation, instead of full blood, you will get anything. I have admiration for the Belgian horse, and for the Percheron, and for the Clydesdale, but they all want to be bred along their own line. There are advantages in each particular line. For instance, the 'shire is a cold-blooded horse, the old Roman war-horse, with some Flanders blood.

MR. BRODHEAD: One question more. In a grade Percheron horse, if the female comes to maturity at about two years of age, would you advise breeding her at that age, if it is a well-developed mare?

DR. GAY: You came here loaded, I see. You have brought up two important questions that horse breeders know. It is a very timely question, I think. There have been I don't know how many editorials by James Johnson of the "Breeders' Gazette" on this very subject. In the old country it is the custom to breed these young mares, but they don't work them. They will foal first at three years old, and then they take them and work them a year, and breed them again at four. They put them out to make half a team the third year. My advice would be that if you have a good, broken filly that is forward, to push her and breed her, but if you have a stunted filly on your hands, who is at two years old what she should be at one, set her back.

MR. BRODHEAD: The reason I brought these questions up is this: Dr. Gay is at the head of the breeding interests in this State, and I want him to go on record in this matter in the Bulletin which we expect to publish.

The CHAIR: Any further questions? If not, we will take up the last subject on the program, "Some Facts a Successful Dairyman Must Know," by Dr. M. E. Conard.

Dr. Conard then spoke as follows:

SOME FACTS THAT A SUCCESSFUL DAIRYMAN MUST KNOW.

BY DR. M. E. CONARD, *Westgrove, Pa.*

Mr. Chairman, Ladies and Gentlemen: I feel very much as if it was imposing on good nature to ask you to sit here when you are anxious to get away to your homes. I feel that way myself, especially as a great many things have already been said on the subject of sanitation, which is an important part of my subject.

What I want to speak of is what the successful dairyman must know. He must know the principles of his business. He has the opportunity to feed the consumer with an article of food that is more used, almost, than anything else unless it is perhaps bread. It is taken by the weak class, and for the most part raw; they get it daily just as he milks it. It is a business that contributes as much, if not more, than any other kind of farming to the sustenance of the nation. In some sections where agriculture in other forms is not growing, the milk production is growing constantly. It differs from the production of wheat or corn or anything else, in that the barn, as Dr. Detrich has already said, is the factory in which each cow takes the place of a loom or machine, or whatever it may be, to turn out the finished product.

Now, the first thing the farmer has to do is to build this barn and keep it in a sanitary condition. He must have in mind what he is going to produce, and what is required of it, and he must make his factory accordingly. He must know the cheapest and best way to build that building, so that the running expenses will be as little as possible. He must know that sunlight is the cheapest and best antiseptic we have, and it is free for the asking. It is good, and always ready, and is efficient, so build that building in a position where you can get the sunshine to do its voluntary work. I am not going into the details of building that barn. I am only going to talk a very few minutes, and these details are so numerous that I could talk about them for hours.

He must know dirt when he sees it. I am making a safe assertion when I say that there are more than half the dairymen who don't know dirt when they see it. Dirt is matter out of place. An innocent little clover leaf out of place becomes a detriment. Dirt gets into the milk and can never be taken out entirely. An atom of dust may be taken out, but you can't get the germs out. I won't go into the details of eradicating the germs, because that was so exhaustively discussed yesterday, but remember that dirt cannot be strained out of the milk; the coarse particles may be taken out, but the dirt that is injurious to health cannot be taken out.

Now, how to get this out is the next question, and how are these machines (cows) to be secured, is another question that interests us. Whether they are to be produced on the farm, or whether they are to be bought is a matter that each individual must decide for himself. Much depends on your farm. If there is a large amount of meadow land it is possible to produce them to better advantage than to buy them, perhaps. I made a calculation a few weeks ago, charging for the calf at birth $3.00, and figuring the cost of everything that would go towards raising that calf at a good high price, and it amounted to $39.45, but I included things that would not have to be bought, so $35 is a good, high price. Suppose 25 per cent. of them go wrong and are not worth anything, the ones that are, are worth fifty dollars, and the ones that are not are worth perhaps five hundred pounds of beef at the butcher's, at six or seven cents a pound, say $30. Say that only half of them turn out to be good cows, you are ahead of the game.

To get the kind of cow you want is the question, and she is not usually sold,—a cow that is just exactly what you want, and is suitable for your purpose, is a pretty difficult thing to get, but it can be done. There are two methods of getting them; you can either buy or raise them on the farm. Sometimes we must go back from the railroad where they can be raised more cheaply. The health of the cow must be watched over very carefully. You can easily learn whether she is sound, by making the tuberculin test. There are some localities in the state where they are perfectly free from tuberculosis, and others where it is very prevalent. Where cows are shipped in in large numbers, and where they congregate in large numbers, it is probably very prevalent, but in country districts it does not, as a rule, prevail to any large extent.

Feeding the cow is too long a subject to take up this morning, so I will speak of it only as it affects the milk for sale. We can feed them a balanced ration, or anything of that kind, but I only want to refer to it as it affects the flavor of the milk. Our ordinary feeds of corn and oats and bran, have no pronounced effect on the odor of the milk, and are not detrimental, but in the Eastern part of the State, perhaps it is not so out here, we are troubled very much with the garlic, which grows largely in our pastures, and which the cows eat in large quantities. It contains a volatile oil, which affects the flavor of the milk. Then, they are using a great deal of ensilage, which becomes more or less acid, but this acid is absorbed in the stomach, and does not affect the milk in any way whatever, unless it is fed in such a way and at such times that it fills the air with the odor about the time the milking is being done. Then the milk becomes tainted with it so that it has become a little difficult to decide that matter, simply because of the difficulty of feeding it under these conditions. To feed a cow ensilage, and not saturate the stable atmosphere at the same time is a little difficult, but experiments have proven that if the ensilage is fed at a time when it will not saturate the atmosphere, it will not affect the milk.

The care of the cattle is a subject that I hesitate to speak of. It is so long; so I will only speak of cleanliness. The stable should be constructed in such a way as to make it easy to keep it clean. Troughs should be so placed as to render it possible to keep the posterior parts of the animals clean, and that the cow when she is lying down is not in the cold and dirt. The ceiling should be so constructed that it can be frequently swept and white-washed, and leave no room for cob-webs there. This is not a condition that requires much outlay of money; simply a little bit of work, but, as Prof. Van Norman says, it is work that has to be done twice a day every day in the year. I have in mind one or two of these stables, that have been allowed to deteriorate, and they look worse in some ways than if they had never been fixed up. I know a barn that was fixed up and put in nice condition, and the farmer kept it in shape for a while, but it has gone to pieces; the ceiling is dropping down, and it looks like, well, I hardly know what it looks like. If you cannot begin to keep up the eternal vigilance, don't begin to keep it clean.

This sanitary improvement is here to stay; the people are going to have better stuff and pay for it, and the man who is going to keep cows, and not keep his stables in sanitary condition, had better get out of the business.

In order to be successful, the dairyman must know whether any cow is paying for her keep, or not; he must know whether she is producing a sufficient amount to pay for her keep. If she is not. she must be done away with. This can be done very cheaply and easily by simply weighing the milk, and charging off her keep against the value of the milk.

Then he must know what the consumer wants. Suppose your customer requires milk of 3½ per cent. or 4 per cent. butter fat, and you have a herd of Jersey cows. You are producing for 8 cents. 4½ per cent. to 5 per cent. of butter fat. That is not economy. You are giving more than you are getting paid for. On the other hand, if you give them only 3½ per cent. when they call for 5 per cent. and pay for it, you are not giving them full value for their money. You must first find out what the market calls for, and then produce it.

In large cities. like Philadelphia, there is used a little less than half a pint of milk per day per capita, but if you look over the average family, you will find that this is not strictly the case. There is always some weak member, or a child, so that the larger part of the milk is consumed by the weaker members of the family. We are producing milk for the weak, and they have less resistive power than some of us have. That increases the responsibility of the producer. You know that milk in its original state was never intended to be exposed to the air or sunlight. It is produced in the gland of the animal, and when we undertake to supply the community with this produce, we must endeavor to supply this deficiency and protect it as nearly as possible as it was protected by nature. Knowing the susceptibility of milk to contamination, we must exercise a great deal of care. We must see that the health of the animal is such that she will produce good, sound milk. If she is diseased in any way, the milk is unfit for use. The question has been raised as to whether cows suffering from tuberculosis, who do not have infected udder, can produce tuberculosis in man. That is a difficult matter to decide, because there are so many other ways in which infection can get into the milk, as well as from the milk. Suppose an animal has tuberculosis of the lungs. There is usually a little coughing and expectoration, and this is swallowed. It passes through the alimentary canal, and becomes dry, and probably lodges on the back or sides of the animal. I doubt whether an animal which has a diseased udder can spread tuberculosis more readily than it is spread in this manner. The only remedy is perfect cleanliness of the posterior parts of the animal. I notice where the inspections are made, a record is kept by score cards, with the different points setting forth the value of sanitary conditions. For instance, the stable counts for so many points; the health of the cow for so many points; the milker for so many points. I notice there that through the faeces is a very frequent source of contamination. Another frequent source is the milker. By his habits—for instance, if he is handling the sides of the cow, and then sets the bucket in place, or lets some of the milk pass through his hands into the bucket, he will wash down everything on that cow into the milk. There is no more fertile source of contamination. The clothing of the man, coming from the horse stables, should at least be freshened, so that no germ can enter into the milk in that way. There are many other ways of contaminating the milk—through the udder of the animal, through the faeces, through the milker, through the cooler, and even the air in which it is cooled. I would always have the location of the milking house on the northwest side of the building, because the prevailing winds are northwest, and they carry the greatest amount of dust, so that there are more days on which we can have a freer, purer air on the northwest side of the building.

MR. HERR: I would like to know if the Doctor thinks that butter from these cases is less injurious than milk?

DR. CONARD: Why, yes; much less so, because we eat so much less of it. A great many of the germs would pass out in the buttermilk. The percentage that remains one would get out of a given amount of the cream in the butter.

MR. HERR: Then more cleanliness and more care is necessary in those who sell the milk than in those who sell the butter.

DR. CONARD: The water in which the vessels are washed has already been referred to, and I can only emphasize the necessity of pure, clean water. Germs of typhoid will multiply in milk, and a very few germs on the outside of a can rinsed in foul water may fall into the milk, and it is possible in a very few hours to have the milk full of germs. It is very important, then, that we have the source of our water supply absolutely free from contamination.

Pasteurizing is simply an excuse for a thing that is not done. It is the excuse for carelessness. It is perhaps the best excuse we have, but Pasteurization is not what it is believed to be by people who are not familiar with it. It is the process of heating the milk to destroy the disease germs. It has been learned by Pasteur that a temperature of 160 deg. for twenty minutes will prevent the souring of the milk. It will not destroy the spores, but Pasteurization will destroy the germs. But there are some germs that grow in cold—such, for instance, as flourish in ice-cream, or even in cold milk. So Pasteurizing does not make it entirely safe, although it makes it better, as it kills the acid forming germs and lengthens the time before souring. But it is simply an excuse for carelessness. If the milk had been properly produced at the farm, and then kept at a temperature of say forty to fifty degrees, Pasteurizing would not be necessary, but it does insure safety to quite an extent, since it is necessary. The city dealer is doing it right along. They have Pasteurizers at the receiving stations in the city, and the result is that the people are getting a milk that tastes well, and looks nice, but they don't know anything about the age of it, and they may be getting something that is extremely injurious.

Sterilized Milk. Milk cannot be sterilized without boiling, which changes the consistency of the milk, so that sterilized milk for the market is not a practical thing.

MR. LIGHTY: Is it not a fact that the lactic acid in the milk will in a measure retard the development of some of the injurious germs, and sometimes destroy them?

DR. CONARD: The lactic acid bacteria sometimes destroy other harmful ones, and in that way they are beneficial.

Certified milk has been touched upon. It is milk that has been produced under conditions that can be certified to that it contains less than a certain number of bacteria per cubic centimeter, and it can be produced under reasonable conditions. Many of the certified milk conditions are expensive simply because they are made so by very rich people who produce this milk for their own pleasure, but there can be no question but that certified milk can be produced under less expensive conditions. Plenty of whitewash on rough boards is just as good as cement for the sides and ceiling of the barn, and certified milk sells for nine cents a quart, while milk produced under ordinary conditions brings only four cents—or say eight cents; so that you are getting four cents for milk, and four cents for cleanliness which costs practically nothing. I say costs nothing, because the sanitary conditions under which the milk is produced are conducive to the good health of the herd, and of your people, and also because you receive a better price. You are paid four cents for simply doing your duty.

MR. WAYCHOFF: Does milk become certified milk if it is produced under these conditions and then certified to?

DR. CONARD: No; in Philadelphia, as in other large cities, there is a society that looks after this matter; they say to the farmer that if he will produce milk under certain conditions they will give him a certificate that will enable him to sell certified milk. The herd must be examined for tuberculosis every three or six months; the premises must be inspected every month; at stated times they go to the wagon and take a bottle of milk which they have tested by their bacteriologist. If it runs more than ten thousand bacteria to the cubic centimeter, it is rejected; if less, it is considered all right; after it has passed all this they give a little certificate, which the producer puts on the cap of his bottle, certifying that this milk is up to their standard and is recommended for infants' food.

MR. McCREARY: Can a dairyman increase the amount of butter fat in the milk, or the supply of milk by feeding certain kinds of feed?

DR. CONARD: I think the most approved feeders say "no." Now that may be modified by some condition like this: A cow when she is taken for the test, may be below her normal condition, and a change in rations may bring her up to her normal condition. But I think this is scarcely worth considering. A cow is born giving a certain amount of milk, and that she will give.

MR. BILLINGS: I would like to ask the Doctor if he has had any experience with milking machines?

DR. CONARD: I have not had any experience; a little bit of observation only.

MR. LIGHTY: Doctor, Mr. Billings has had some experience. Get him to give it to us.

MR. BILLINGS: I came here to learn and not try to teach you anything. Of course, I have had experience in the caring of barns, but what I would like to know is in regard to the sanitary conditions of the milking machinery, and also the supply. We have a foot power milking machine, and we think it is first-class. Of course, it has to be looked after and kept clean, and it takes quite a long time to get a man who will run it properly. One objection seems to be that you can't milk the cow clean with it, but last winter by using this machine, with one man and a boy, we handled a herd of forty-six cows, which we could not do without the machine, because we have quite some other work to do in addition. We think it a success. Sometimes the men seem to object to it, but all they want is two or three milkings, and then they come back to it again. Ordinarily ten or fifteen cows is all one man wants to handle, but with the machine a man can milk all day.

MR. CLARK: How about the bacteria? Do you find as many in the milk as if you milk by hand?

MR. BILLINGS: We are engaged in making butter, and we have never had our milk tested, but our barn is practically a new barn. and we do our best to keep things in a sanitary condition. We get a high quality of milk, but it is almost impossible to keep everything out of the milk. Still, we think we produce a cleaner quality of milk by using the machine than without it.

DR. CONARD: I am glad to hear that the machine is all right, and that the effect on the cow is all right.

SECRETARY MARTIN: My friends, this closes the Eleventh Annual Normal Institute. We have spent four days upon the mount of higher agricultural education, and enjoyed the pleasure of learning from instructors who have come to us from the National School of Expression. It would be doing violence to my feelings at this hour if I failed to express in a word my appreciation of the attendance of the County Institute Managers of Pennsylvania, coming, as they did, to this meeting from the four corners of the State, across the mountains and valleys of Pennsylvania, three hundred, four hundred miles, many of you have traveled to lend your encouragement to this great work; and our corps of lecturers, more than sixty in number, with the exception of one, were all here, doing many things that led up to this great close. This closing session of our meeting has been depleted by the departure of trains carrying our people to their homes, but I am sure we all leave the better for having been here.

MR. CLARK: I would like to say just two or three words; they will be very short. It is a pity that so many of the people of our State are drifting into the business of merely making money—are drifting in to a position where they look on the Almighty Dollar as the greatest thing in the world, to the exclusion of everything else that makes life better and happier. I believe in these social meetings and gatherings for the exchange of thought, and it grieves me to see this growing tendency to look at things in this narrow and contracted way. I have been watching it for years, and I cannot help but see it coming. I laughed yesterday when our good friend, Seeds, spoke of becoming narrower and narrower until at last you lap over, but, my friends, it is no laughing matter; the danger is only too great. I tell you, to get together and talk things over in the manner we have done this week, and to meet old friends, is worth the time and money ten thousand times over.

A Member: As a resident of this county, I wish to express our gratitude for the resolutions in appreciation of the hospitality extended to the Farmer's Annual Normal Institute. We, on our part, appreciate your coming here to us, and we trust we shall again have the pleasure of having you meet with us before many years.

MR. WAYCHOFF: We had an important topic yesterday but the time was all taken up, so I did not get on the floor.

The first means towards securing proper ventilation is a thermometer large enough to let the mercury be seen from all parts of the hall, and as it rises or falls the janitor should open or close the windows.

As a precaution in case of a fire or panic of any kind, the doors should be made to slide instead of open in or out. This would largely obviate the danger.

SECRETARY MARTIN: Any further remarks? If not, I pronounce the Annual Normal Institute for the year 1908 closed, and hereby adjourned.

A. L. MARTIN,

Deputy Secretary and Director of Institutes.